BULLETIN OF MISCELLANEOUS INFORMATION Appendix II 1932
ROYAL BOTANIC GARDENS, KEW

REVIEW OF THE WORK OF THE ROYAL BOTANIC GARDENS, KEW, DURING 1932.

General.

STAFF.—Kew suffered a great loss by the death on March 4th of Mr. T. W. Taylor, who had been Curator since May, 1929 (*K.B.* 1932, 112, 156). Mr. J. Coutts, Assistant Curator in charge of the Decorative Department, was appointed to fill the vacant post (*K.B.* 1932, 155). Mr. A. S. Wilson was appointed Assistant Curator in succession to Mr. Coutts.

Mr. J. Aikman, the Director's Confidential Assistant, retired under the age-limit on October 8th, after nearly 44 years service at Kew (*K.B.* 1932, 459). Mr. S. F. Ormsby has been appointed Chief Clerical Officer in the Director's Office in succession to Mr. Aikman.

Mr. B. L. Burtt has been appointed an Assistant Botanist in the Director's Office.

OFFICIAL VISITS.—During April Mr. MILNE-REDHEAD visited Brussels, and spent a fortnight in the herbarium of the Jardin Botanique de l'État comparing specimens from Northern Rhodesia with type specimens of species from the Katanga Province of the Belgian Congo. As a result of this visit it has been possible to identify and record a number of species, previously known only from the Congo, as occurring also in Northern Rhodesia. In connection with research on Tropical African Compositae, Mr. B. L. BURTT spent five days at the Brussels herbarium in the early part of August. A large number of Kew specimens were identified and several doubtful questions settled.

In connection with the preparation of the final part of the Flora of West Tropical Africa, Mr. J. HUTCHINSON and Dr. J. M. DALZIEL paid a visit to Paris in November to study the collection of West African Monocotyledons in the herbarium of the Laboratoire d'Agronomie Coloniale, and certain types in the herbarium of the Muséum d'Histoire Naturelle. Both the Director of the Botanical Department, Prof. H. Humbert, and Prof. Chevalier gave every facility for the work and the latter also kindly supplied lists of vernacular names for inclusion in the Appendix to the Flora. He further forwarded on loan about 250 specimens, including grasses, for detailed study, collected during his latest journey into the Sahara.

Professor C. Houard, the Director of the Botanical Institution of the University of Strasbourg, having generously offered the National Herbarium at Pretoria a set of duplicate South African specimens collected by Ecklon, Zeyher and Drege, the Assistant for South Africa at Kew, Mr. R. A. DYER, spent some days at Strasbourg in May in order to select the specimens from the herbarium. As a result of this visit the Pretoria herbarium has been enriched by a valuable collection of 550 specimens, including many type numbers. On the return journey Mr. Dyer visited the herbarium at Leiden and the experimental garden of the University under the charge of Dr. W. A. Goddijn.

COLLECTING EXPEDITIONS.—The following expeditions were rendered possible thanks to the grant received from the Empire Marketing Board for overseas missions and collecting purposes.

In the early months of 1932, Mr. G. W. ST. CLAIR THOMPSON, late of the Tsetse Research Department, Shinyanga, Tanganyika Territory, carried out a collecting trip in Tanganyika and N. Rhodesia. After spending ten days in the Northern Province, collecting on Oldeani and neighbouring mountains, Mr. St. Clair Thompson proceeded south to Iringa Province, where he remained for six weeks, making extensive collections in the mountainous country between New Iringa and Abercorn on the N. Rhodesian boundary, especially on Mt. Rungwe and the Poroto Mountains.

In March, 1931, the Colonial Office, following on Mr. Collenette's work with the Anglo-Italian Boundary Commission in Somaliland in 1929/30 (*K.B.* 1931, 401), offered the Director the opportunity of attaching a botanist to the British Somaliland-Ethiopia Boundary Commission, which left England in November 1931. The Director was able to arrange for MR. J. B. GILLETT, Scholar of King's College, Cambridge, who has had previous collecting experience in Africa with General Smuts and Mr. J. Hutchinson, to join the Commission.

Owing to the botanically dull character of the opening stages of the work of the Commission, Mr. Gillett did not leave England until September, 1932. After collecting round Hargeisa, the temporary base camp of the Commission, Mr. Gillett made a trip south-eastwards along the boundary, and subsequently two journeys in the country north-west of Hargeisa. He hopes to spend some time collecting in the mountainous country around Harrar, in Abyssinia, an area which has been very little explored botanically. One case of dried specimens, seeds and tubers has already been received from Mr. Gillett, and he is also making an ecological survey of the vegetation.

TUNG OIL.

Aleurites Fordii.—A definite resting season appears to be essential for the proper development of this species. This can be effected either by a cold or by a dry season. Without such conditions the plant does not appear to be able to thrive. This

practically eliminates the humid tropics, and it is only at high elevations where definite dry seasons occur that there is any likelihood of this species thriving in these areas. Trees raised from seed are very variable both in habit and in their fruiting capacity. The size of the fruit and the size of the nut are also very variable. Hence, if this is to become an economic crop, it appears certain that vegetative methods of propagation will have to be adopted. American experience shows that there is little difficulty in using a system of patch budding and trials reported from Assam support this view. A sufficient number of seedling trees has now been established in those countries where the crop is likely to succeed and where the maturity of the trees is sufficiently advanced. The selection of " mother " trees which will supply bud wood is being made and methods of budding are being investigated.

Samples of fruits from Empire sources are being collected as they become available and these are being examined and reported on to the Imperial Institute Sub-Committee for Tung Oil by the Director of the Paint Research Station of the British Paint, Colour and Varnish Manufacturers Association.

Aleurites montana.—This species has now been satisfactorily established in several parts of the Empire. It is a more tropical species and reports received indicate that it is likely to thrive in many countries where the climate is too tropical for *A. Fordii*. Trees which were raised from seed supplied in 1927 to the East African Agricultural Research Station at Amani have this year flowered freely. So far, however, the trees have only formed female flowers. Examinations made of the oil of this species show that it differs slightly from that of *A. Fordii*, and, though it does not come up to existing standard specifications for Tung oil, the oil is eminently suitable for the manufacture of paints and varnishes.

Banana Research.—The collections of types of *Musa Cavendishii* from the Canaries and from Brazil which have been grown in the Banana Quarantine House have been propagated and suckers have been despatched to Professor Cheesman at the Imperial College of Tropical Agriculture at Trinidad. There still remains a variety of this species of *Musa* which was obtained from Burma and it is expected that suckers from this will be sufficiently mature for despatch in the summer.

It is hoped this next season to obtain collections of banana varieties from the east and from the west coasts of Peninsular India and the Directors of Agriculture in Madras and Bombay have been asked to assist in procuring planting material. Efforts are also being made to obtain planting material of *Musa nana* from French Indo-China.

Plant and Seed Introduction.—At the Conference of Colonial Directors of Agriculture, which was held at the Colonial Office in July, 1931, a resolution was adopted in which recommendations

were made " that steps should be taken to facilitate the dissemination of information in connexion with the introduction of economic crops and varieties thereof, and also in regard to their sources of supply." It further recommended that the Royal Botanic Gardens, Kew, should be asked to undertake this work in co-operation with Colonial Departments of Agriculture.

In response to this resolution a list of cultivated crop plants (other than those confined to temperate regions) was prepared, and this has been circulated with a questionnaire not only to Colonial Departments of Agriculture, but also to India, the Sudan and to those Dominions which control tropical and sub-tropical regions. In this way an inventory of tropical and sub-tropical crops throughout the Empire can be prepared, which will in the future enable more detailed work on particular crops to be undertaken. Already replies to this questionnaire have been received from most of the Colonies and from some of the Dominions and the information has been indexed. This is the first time that an inventory of the economic crops of the Empire has been attempted, and, even in its present incomplete form, it has been of considerable use in dealing with enquiries from the Colonies.

DIRECTOR'S OFFICE.—The alterations which were described in the Annual Review, 1931, 11, were completed in March of this year.

The Registry, which is accommodated in the room formerly used by the Director, is being reorganised, and a clerical officer has been appointed as Registry Clerk.

PUBLICATIONS.—During the year ten numbers of the *Kew Bulletin* were published and only one Appendix, instead of two. This was due to the omission of the " List of Seeds," which is being published as a separate pamphlet (*K.B.* 1932, 352). The present " Review " will form Appendix II, 1932, and will be bound in the volume for that year. In future there will be only one Appendix, namely the " Review " for the current year (*K.B. loc. cit.*)

A new edition of the " Popular Illustrated Guide " was published in July.

The revision of the " Hand-list of Rock Garden Plants " has been commenced, the nomenclature being revised throughout. The new hand-list will include both Monocotyledons and Dicotyledons, and a list of woody plants suitable for growing in rock gardens will be appended.

The " Hand List of Trees and Shrubs " is also under revision.

The Gardens.

VISITORS.—The number of visitors to the Gardens in 1932 was 1,068,395, a decrease of 320,789 as compared with the figures for 1931.

This serious falling off appears to have been fairly general throughout the year, with the exception of the months of March

and December, and was no doubt due to some extent to general economic conditions. The Sunday figures were 120,571, and the week-day figures 200,218 less than those in the previous year.

The greatest monthly attendance was in May with 224,677 and the lowest in December with 12,886. The highest daily attendance was 33,416 on Sunday, 12th June ; the lowest was 12 on November 22nd.

The penny charge for admission, which was reimposed on October 5th, 1931, and the charge of sixpence on Students' Days (Tuesdays and Fridays) remained unchanged.

Flower Garden.—The removal of the clipped golden yews in the formal Rose Garden, with the exception of two at either end of the cross-paths, has necessitated setting back the end yews in line with the pyramidal hollies at the ends of the vistas. Two rose beds have also been set back and two new ones made to match the pair at the end of the Sion Vista. The removal of the clipped yews adds greatly to the appearance of spaciousness in this section of the Gardens.

New or noteworthy plants that have flowered for the first time at Kew are: *Isotoma anethifolia, Mutisia subulata* and *Crindonna Memoria-Corsii.*

Rock Garden.—A portion of the south end of the Rock Garden has been reconstructed, the old soil being removed and replaced with fresh compost. This has resulted in a marked improvement in the health and vigour of the Primulas and other plants cultivated at this end of the garden.

One of the most interesting plants which flowered was *Primula Wollastonii.* This choice Primula and a share of a large consignment of seeds were presented by the Maharaja of Nepal to H.M. The King, for the embellishment of the Royal Parks and Gardens.

The interesting experiment of Capt. Kingdon Ward in bringing back living mat plants from his expedition in N. Burma gave fairly successful results and the following species were identified : *Salix* sp. near *S. Lindleyana, Nepeta lamiopsis, Hoeckia Aschersoniana, Epilobium* sp. probably *E. Wattianum, Juncus* sp. probably *J. elegans, Polygonum viviparum, P. Forresti, Fagopyrum cymosum* and others.

Temperate House.—The whole of the exterior of the Temperate House range and the interior of the Himalayan section have been repainted, and two new sectional boilers have been installed to replace worn out saddle boilers. The intention is to replace in this way—as opportunity occurs—all the old types. In the nursery a new frame has been constructed to replace the one that had to be demolished to make room for the new Arboretum pit.

The collection of Rhododendrons in the Himalayan and Chinese sections, which was becoming over-crowded, has been opened out

and re-arranged where necessary. The large specimen of *Talauma Hodgsonii* in the main building and the giant honeysuckle, *Lonicera Hildebrandiana*, have flowered freely. The latter, which has now attained a length of 70 feet, produced a number of green, globose fruits, 1–1¼ inches in diameter. *Asparagus falcatus*, the largest species in cultivation, produced its primrose-coloured, deliciously fragrant flowers in wonderful profusion during July.

Amongst the newer Rhododendrons of note which have flowered during the year, mention may be made of *R. Taggianum*, *R. scopulorum*, and *R. sino-Nuttallii*, which first flowered at Kew in 1930.

A large plant of *Cytisus Battandieri*, native of the mountains of Morocco, growing outside in one of the bays on the south side of the Temperate House, produced its fragrant, golden yellow flowers in great profusion during May and June, and was perhaps the most outstanding plant of the year.

ARBORETUM.—Early in the year somewhat extensive alterations were commenced in the lay-out of the ground between the Main Gate and the end of the Broad Walk. The two old Chusan palms (*Trachycarpus excelsus*) in front of No. 1 House were removed and replanted with existing specimens in the shrubbery, and, in order to accentuate the formal lines of the house, the surrounding Irish yews were planted at the corners of the paths. The plot in front of the house was laid out in formal beds, in which a display of bedding Dahlias was made during the summer. The existing Rhododendrons, in several cases overgrown, were cleared, some of the plants being sent to the new Pinetum at Bedgebury. To conform with the general layout the beds have been re-made with straight sides and planted with a collection of Rhododendron (Azalea) species including *R. Vaseyi*, *R. viscosum*, *R. occidentale* and *R. luteum*. To prolong the flowering season a selection of the larger growing species of *Lilium* has been planted in the beds. The screen of trees and shrubs in this part of the garden is in process of being widened and re-planted with more choice subjects.

The collections of *Lonicera* and *Rhamnus*, which in the past have been scattered indiscriminately over a large area of lawn, have been planted in beds and gathered together into two compact areas. This has opened up several unexpected views and should give better cultural conditions for the individual plants. The general upkeep will also be greatly simplified.

A new and more direct path has been made to the Tea Pavilion. The road on its north side has been turfed over and the surrounding gravel tarred.

In the Arboretum nursery a new sunk pit has been built alongside the old propagating pit.

Meliosma Veitchiorum and *Styrax Veitchianum* have flowered this year, the latter for the first time at Kew.

TROPICAL DEPARTMENT.—The collection of Cycads at the south end of the Palm House has been rearranged and brought together into one group, the shrubs that were formerly growing with them having been moved elsewhere. This rearrangement has greatly improved the appearance of this unique collection.

A new electric motor for pumping rain-water has been installed in the Palm House stokehole, and the hot water pipes in the central portion of the house have been thoroughly overhauled.

The collection of Filmy Ferns, which for some years has been in an unsatisfactory condition, has been replanted in fresh compost. While it was empty the opportunity was taken to overhaul and repair the house.

In House No. 2 many of the hot water pipes have been replaced and a new sectional boiler has been installed in place of two old saddle boilers. In House No. 5 the plants in the centre bed at the north end have been rearranged, the Aloes and Euphorbias, as far as possible, being grouped together. On the staging at the south-west end a miniature rockery has been constructed to accommodate a collection of small South African succulents. In the Office Yard the hot water pipes have been overhauled in Houses Nos. 18B and C., Houses Nos. 1 and 2A, and Pits Nos. 6 and 6A, 10–15, and 17B have been painted externally.

Plants worthy of notice which have flowered are : *Dasylirion quadrangulatum*, *Gurania malacophylla* and *Paphiopedilum Wardii*, a new species introduced by Captain Kingdon Ward from Upper Burma.

SHERMAN HOYT CACTUS HOUSE (See Annual Review, 1931, 12). —In the early months of the year the arrangement of the rock-work and planting were undertaken. The house was formally opened in the presence of the Minister of Agriculture and Fisheries, the Secretary of H.M. Office of Works, the President of the Royal Horticultural Society, and others, and was opened to the public on Easter Monday, March 21st, 1932. Three seats for the convenience of the public have been placed in the house.

WATERFOWL.—The collection of ornamental waterfowl has been maintained in good condition during the year. The chief additions were a pair of maned geese from Australia and a pair of white decoy ducks, the latter presented by Mr. R. N. N. Murray of Chiswick.

GREY SQUIRRELS.—Two pairs of grey squirrels were presented to Kew by the Duke of Bedford in 1907. They multiplied rapidly and the red squirrels which used to be seen in the Gardens disappeared. During the past few years many have been shot to keep the numbers in control, and during the past year they have been practically exterminated. Well over 1,000 have been shot in recent years.

Rainfall Record.

Rainfall recorded at the Royal Botanic Gardens, Kew, during 1932 :

	Inches.		Inches.
January	1·63	July	1·85
February	0·20	August	1·09
March	1·34	September	2·15
April	2·07	October	4·84
May	3·90	November	1·29
June	1·02	December	0·46

Total 21·84 inches.

The total for 1931 was 23·61 inches.

Student Gardeners : Changes in personnel.—Seventeen men completed their training, while one went to Mr. Cecil Hanbury's garden at La Mortola for a year. The Siamese student, and the two Maltese, having finished their courses, returned to their own countries. A Dutch student came to Kew for a period of two months before taking up an appointment at Cantonspark Botanic Garden, Baarn, Holland. A Swedish student returned to Stockholm, and an Australian went back to New South Wales to engage in a nursery business in that State.

Of the seventeen men who finished their courses, thirteen secured appointments at home (Parks Departments eight ; private gardens or nurseries four ; Botanic Garden one). Two men proceeded overseas to take up positions, one to Madras and one to Randfontein.

Sixteen Student Gardeners were admitted for training and in addition two men returned from La Mortola to complete their period of service.

Of the sixteen new entrants, twelve are from Great Britain (private gardens or nurseries eight, and Parks Departments four). The Student Gardeners from overseas include an Italian from La Mortola ; one from Canada, where he was engaged in a large plant nursery ; one from Prince Alfred Park, Port Elizabeth, Union of South Africa, and one from the Botanic Gardens, Dunedin, New Zealand.

Contributions to the Gardens, 1932.—During the year 1,054 separate consignments of living plants, seeds, etc., were received and added to the collections. This number represents an increase of 68 over last year and is the highest number recorded in the history of the Gardens. The more important donations were as follows :—

Public Institutions :—

Berlin, Botanic Gardens.—64 packets of seeds.

Bermuda, Department of Agriculture.—A consignment of bulbs of *Lilium Harrisii*.

Brooklyn, Botanic Garden.—35 packets of seeds.

Brussels, Botanic Gardens.—22 packets of seeds.

Buitenzorg, Botanic Gardens.—Seeds of economic plants.
Calcutta, Royal Botanic Gardens.—Seed of *Amorphophallus campanulatus.*
Chelsea Physic Garden, London.—36 packets of seeds, and plants of *Solanum citrullifolium.*
Coimbra, Botanic Garden.—45 packets of seeds.
Copenhagen, Botanic Garden.—A collection of *Begonia* spp.
Darjeeling, Lloyd Botanic Gardens.—72 packets of seeds.
Dehra Dun, Forest Research Institute.—Seeds, including *Arundinaria Pantlingii.*
Dunedin, Botanic Gardens.—267 packets of seeds and a collection of New Zealand plants.
Edinburgh, Royal Botanic Garden.—712 packets of seeds collected by the late Mr. G. Forrest ; 183 packets of miscellaneous seeds, and plants of *Todea superba, Leptodermis pilosa,* etc.
Federated Malay States, Department of Agriculture.—Suckers of Musas in variety.
Fiji, Department of Agriculture.—Tubers of *Dioscorea* spp.
Geneva, Botanic Garden.—47 packets of seeds.
Glasgow, Botanic Garden.—46 packets of seeds.
Glasnevin, Botanic Gardens.—Seeds and plants.
Gothenburg, Botanic Gardens.—38 packets of seeds.
Hakgala, Botanic Gardens, Ceylon.—A collection of seeds and bulbs.
Hobart, Botanic Garden.—A collection of Tasmanian plants.
Jassy, Botanic Garden, Roumania.—37 packets of seeds.
Kaunas, Botanic Garden, Lithuania.—56 packets of seeds.
Kirstenbosch, National Botanic Garden.—77 packets of seeds ; corms of *Watsonia Wordsworthiae* and a collection of *Pelargonium* spp.
Leningrad, Botanic Garden.—58 packets of seeds.
Lisbon, Botanic Garden.—37 packets of seeds.
London, Hyde Park.—A collection of 58 packets of seeds collected in Nepal ; stove and greenhouse plants including *Eustoma Russellianum* and *Blumenbachia chuquitensis* ; herbaceous and alpine plants and a collection of *Meconopsis* spp.
Malta, Department of Agriculture.—Seeds of *Vicia leucantha* and plants of *Centaurea crassifolia.*
Montpellier, Botanic Garden.—82 packets of seeds.
Munich, Botanic Garden.—A collection of ferns, stove plants, alpines and succulents.
New York, Botanic Garden.—61 packets of seeds, including *Cycas Wadei.*
New York State Agricultural Station, Geneva, N.Y.—Plants of *Prunus tomentosa* var.
Ottawa, Central Experimental Farm.—50 packets of seeds.
Oxford, Botanic Garden.—Seeds and plant of *Eichhornia azurea.*
Palermo, Botanic Garden.—35 packets of seeds.
Paris, Museum d'Histoire Naturelle.—54 packets of seeds.

Peradeniya, Royal Botanic Gardens.—A collection of palm seeds.
Rostock, Botanic Garden, Germany.—A collection of aquatic plants.
Seychelles, Department of Agriculture.—Seeds of *Sorindeia madagascariensis* and *Northea seychellana*.
Simla, Viceregal Gardens.—Miscellaneous seeds, including *Lilium* spp.
Singapore, Botanic Garden.—Seeds and plants including *Nepenthes Macfarlanei*.
Stellenbosch, University Botanic Garden.—108 packets of seeds, and plants of *Drosera* spp.
Sydney, Botanic Gardens.—Seeds of *Strelitzia* spp.
Tokyo, Botanic Garden.—70 packets of seeds.
Trinidad, Department of Agriculture.—A collection of orchids.
Turin, Botanic Garden.—76 packets of seeds.
Washington, U.S. Department of Agriculture.—Seeds and plants of economic value.
Wisley, Royal Horticultural Society's Gardens.—Seeds and plants, including *Iris Kaempferi* and a collection of *Helianthemum* spp. and vars.

Private Donors :—

Rev. J. Farnworth Anderson, Leicester.—Seeds of alpines.
Mr. C. H. Armbruster, Mallorca.—Plants of *Cyclamen balearicum*.
Mr. S. C. Atchley, Athens.—Seeds, plants and bulbs collected in Greece.
Miss Winsome Barker, Bolus Herbarium, Kirstenbosch.—Extensive collections of South African succulents, corms, bulbs and seeds, including many of unusual interest.
Mr. R. Beck, Dulwich.—A collection of New Zealand fern spores.
Lady Muriel Jex-Blake, Nairobi.—Seeds collected in Kenya.
Mr. G. W. Blathwayt, Porlock.—A collection of pompom chrysanthemums.
Mr. A. J. H. Brown, Bexhill.—A collection of Mesembryanthemums.
Dr. N. E. Brown, Kew.—A large collection of *Conophytum* spp., and other succulents.
Mr. H. Bruins-Lich, St. Helena.—A collection of ferns and *Pelargonium* spp.
Mr. E. G. Bryant, Prieska, South Africa.—Plants, tubers and seeds.
Viscountess Byng of Vimy, Thorpe, Essex.—A collection of greenhouse plants.
Mr. E. N. Carrothers, Belfast.—Plants of *Pinguicula lusitanica*.
Dowager Countess Cawdor, Haslemere.—Red-berried mistletoe growing on olive.
Mr. W. S. Chamberlain, Twickenham.—A collection of seeds from South Africa, and plants of *Primula* spp.
Mr. W. Napier Church, Sandhurst.—A large collection of stove plants and ferns.
H.R.H. Duke of Connaught, Bagshot Park.—Cuttings of Azaleas.

Messrs. Cooper, McDougall & Robertson, Ltd., Berkhamsted.—A collection of seeds of Australian plants.

Mr. W. Cradwick, Mandeville, Jamaica.—A collection of ferns.

Mr. C. H. Curtis, London.—Plant of *Vanda Bensoni*.

Mr. J. E. Dalgliesh, Market Weighton.—A collection of *Populus* spp.

The Donard Nursery Co., Newcastle, Co. Down.—Narcissus bulbs in variety, hardy shrubs, and plants of *Primula Winteri*.

Messrs. C. Englemann, Saffron Walden.—A collection of border carnations.

Prof. M. L. Fernald, New Brunswick.—Plants of *Sarracenia purpurea*, *Xyris montana*, *Habenaria clavellata*, and seeds of North American plants.

Mr. K. A. Fotsch, Hunibach, Switzerland.—A collection of *Begonia* spp.

Mr. A. V. Giblin, Hobart.—Seeds of Tasmanian plants.

Mr. J. S. L. Gilmour, Kew.—Seeds of native plants.

Lady Godley, Gibraltar.—Bulbs of *Narcissus* spp., and plants of *Viola arborescens*.

Dame Alice Godman, Horsham.—Plants, including *Pelargonium Stapletonii*.

Mr. J. Gossweiler, Angola.—A collection of succulents.

Dr. T. Nakai, Director of the Botanic Gardens, Tokyo.—Plants of *Abeliophyllum distichum*, *Boniniella Ikenoi* and *Juniperus taxifolia*. (These were obtained through the good offices of Mr. F. C. Greatrex, H.M. Consul, Nagasaki.)

Mr. Cecil Hanbury, La Mortola.—65 packets of seeds, plants of *Kalanchoe tubiflora* and other succulents.

Mr. H. Harris, Putney.—A collection of succulents and Selaginellas.

The Marquess of Headfort, Kells, Co. Meath.—Plants of *Rhododendron Taggianum*, *Primula muscarioides* var. *hirtescapa*, *P. szechuanica* and seeds of *Fraxinus Paxiana*.

Messrs. Hillier & Sons, Winchester.—Hardy trees and shrubs.

Mr. G. B. Hinton, Mexico.—A collection of orchids.

Capt. Collingwood Ingram, Benenden, Kent.—Plants, including *Delphinium Welbyi*.

Hon. Robert James, Richmond, Yorks.—Bulbs of *Lilium Wardii*, *L. Dalhansonii* and plant of *Clematis Sieboldii*.

Capt. H. A. Johnstone, London.—Large collections of palm seeds.

Dr. A. F. G. Kerr, Bangkok.—Seeds of *Primula siamensis*, etc., a collection of orchids and bulbs.

Mr. C. H. Lankester, Costa Rica.—A collection of orchids.

Mrs. A. C. Latter, Sevenoaks.—Plant of *Cycas revoluta*.

Mr. H. W. Lawton, Wellington, New Zealand.—Seeds, including *Pittosporum lineare*.

Lady Leconfield, Petworth Park.—Plants, including *Calanthes*.

The Executors of the late Mr. W. E. Ledger, Wimbledon.—A large collection of succulents, bulbous plants and orchids.

Mr. H. Q. Levy, Jamaica.—Collections of Jamaican orchids in variety.

Mr. J. N. List, Rangoon.—Plants of *Tacca laevis*.

Mr. F. R. Long, Port Elizabeth, South Africa.—Seeds and plants of succulents.

Mr. J. W. MacGregor, Glasgow.—A collection of herbaceous plants.

Hon. H. D. McLaren, Bodnant, N. Wales.—Plants of *Primula* spp., and plants from Dr. G. N. Humphreys' Ruwenzori expedition.

Mr. E. L. Magnus, Gothenburg.—Plants of *Disa grandiflora*.

Sir John Stirling Maxwell, Pollok House, Glasgow.—A collection of Rhododendrons.

McGregor Memorial Museum, Kimberley.—Succulents, including *Stapelia* spp.

Mr. E. H. Mennell, King's Lynn.—Plants collected in St. Helena.

Lt.-Col. L. C. R. Messel, Handcross.—Plants of *Veronica nivea*.

Rev. Rollo Meyer, Watton-at-Stone, Herts.—Bulbs of *Iris reticulata*.

Mr. C. T. Musgrave, Godalming.—Seedling *Meconopsis* and plants, including *Neillia longiracemosa*.

Col. G. Napier, Horsham.—Bulbs of *Lilium Duchartrei* and *L. Martagon* var. *dalmaticum*.

Major A. Pam, Broxbourne.—Seeds and plants, including *Alstroemeria* spp., and *Crinum Moorei*.

Mr. J. E. M. Reid, Thornton Heath.—Seeds of *Lodoicea sechellarum*, and plant of *Vanda* sp.

Mr. P. Rosenheim, East Molesey.—Bulbils of *Lilium* spp.

Major Lionel de Rothschild, Exbury.—Seeds of hardy trees and shrubs.

Messrs. L. R. Russell, Ltd., Richmond.—Miscellaneous stove plants.

Hon. Mrs. E. Ryder, Beaulieu.—95 packets of seeds, plants of *Encephalartos* sp., succulents and greenhouse plants in variety.

Mr. F. S. Sandeman, Kingennie.—Plants of *Primula Winteri* and collection of Primula seeds.

Messrs. Sanders, St. Albans.—Orchids, including *Liparis plicata*, *Pholidota conchoidea*.

Mr. T. Sharp, Westbury.—Plants, seeds and cuttings of succulents.

Mr. J. K. Small, New York.—A collection of Iris.

Abbé H. Souillet, Milly, France.—A collection of *Lilium* spp.

Major F. C. Stern, Goring-by-Sea.—146 packets of seeds collected by Capt. Kingdon Ward; plants of *Primula* spp. and bulbs of *Lilium* sp.

Rev. F. H. Stock, London.—A collection of orchids and greenhouse plants.

Mr. J. E. H. Stooke, Hereford.—Seeds and bulbs of *Lilium* spp.

Mr. G. M. Taylor, Portobello, N.B.—Seeds of *Lilium occidentale* and bulbs of *Lilium tigrinum* var. *splendens*.

Mr. G. S. Thomas, Chobham.—A collection of alpines.

Mr. G. Thorncroft, Barberton, Transvaal.—Seeds and bulbs of South African plants.

Messrs. W. Treseder, Ltd., Cardiff.—A collection of bedding Dahlias.

Messrs. Vilmorin-Andrieux et Cie, Paris.—59 packets of seeds.

Mr. K. Wada, Numazu-shi, Japan.—Seeds of rare Japanese plants.

Major F. H. Ward, Nairobi.—Seeds, and suckers of *Musa* sp.

Messrs. F. Gomer Waterer, Woking.—A collection of Rhododendrons; plant of *Magnolia taliensis*.

Mr. J. Cromar Watt, Aberdeen.—Seeds and plants, including *Primula Calderiana, Rubus bogotensis*.

Dr. A. H. Williams, Horsham.—A collection of seeds; plants including *Carmichaelia grandiflora*.

Mr. F. A. Weinthal, Roseville, N.S.W.—A collection of orchids.

Messrs. K. Yashiroda, Ltd., Kagawaken, Japan.—Seeds collected in Formosa.

Mr. K. Zwicky, Hunibach, Switzerland.—Plant of *Cereus flagelliformis*.

Distribution of Plants and Seeds.—174 consignments comprising 9791 packets of seeds (hardy trees and shrubs 3492; herbaceous plants 6299) were distributed from Kew during the early months of the year, an increase of 186 packets over the 1931 annual exchange distribution. The largest single consignment was sent to the New York Botanic Garden and comprised 506 packets of herbaceous plants and 82 of hardy trees and shrubs.

Amongst the most important seeds specially distributed were :—*Lupinus Termis, Pinus Gerardiana, Juglans cordiformis, Tectona grandis, Ceiba pentandra, Moultonia singularis, Glycine Max, Crotalaria juncea, Keteleeria Fortunei, Alysicarpus rugosus, Eleusine coracana* and *Arundinaria Pantlingii*.

Wardian cases, containing varied collections of plants, were despatched to the following destinations overseas during the year :—

Government Gardens, Khartoum, Sudan; Department of Agriculture, F.M.S. (2 cases); Public Works Department, Pretoria, South Africa; Mr. R. H. Rumsey, Dundas, New South Wales; Department of Agriculture, Trinidad; Munich Botanic Garden (2 consignments).

In addition, shipments of plants were undertaken to the following destinations :—

Mr. T. H. Everett, New York; Mr. C. H. Lankester, Costa Rica (2 consignments); Mr. H. Q. Levy, Jamaica; Department of Agriculture, Malta (2 consignments); Dr. R. H. Pulleine, Adelaide, Australia.

Three large cases of ginger roots (*Zingiber officinale*) were received at Kew from the Department of Agriculture, Trinidad, and repacked and despatched to the Chief Secretary to the Government, Lagos, Nigeria.

Plants of a seedless variety of pomegranate were distributed to the following, and in some cases the Air Mail postal service was made use of in order to expedite delivery :—Pretoria, Salisbury (S. Rhodesia), Khartoum, Jaffa, Cyprus and Madras.

Other recipients of plants, etc., from Kew, included the following :—

Amsterdam, Botanic Garden.—A plant of *Dicksonia arborescens*.

Admiralty Compass Laboratory, Slough.—A collection of hardy shrubs.

Aberdeen, North of Scotland College of Agriculture.—A collection of grasses.

Alipur, Agricultural & Horticultural Society of India.—Plants of *Hedychium* spp.

Berkeley, University of California.—Seeds of 35 *Lilium* spp. and vars.

Canberra, Forestry Bureau.—Cuttings of *Salix alba* var. *coerulea*.

Coimbra, Botanic Gardens.—Seed of *Typhonodorum Lindleyanum*.

Federated Malay States, Department of Agriculture.—A collection of economic plants.

Forestry Commission.—Hardy trees, including *Populus* spp., and conifers for the National Pinetum, Bedgebury.

Glasnevin, Botanic Gardens.—A collection of plants, including hardy trees and shrubs.

Hakgala, Botanic Gardens, Ceylon.—A collection of Nymphaeas.

John Innes Horticultural Institution, Merton.—Alpines and a large collection of shrubs and greenhouse plants.

Jericho, Government Horticultural Station.—Suckers of Musas.

Louvain, Secrétariat Général Boerenbond Belge.—A collection of genera representative of the family Marantaceae.

London, Hyde Park.—Herbaceous plants.

Malta, Department of Agriculture.—A collection of economic plants and Selaginellas.

Munich, Botanic Garden.—Miscellaneous collections of plants, including herbaceous and alpines.

Middlesex County Council (Roads Department).—Cuttings of hardy shrubs.

Nigeria, Department of Agriculture.—Seeds of *Phaseolus* spp.

Oxford, Imperial Forestry Institute.—Plants of *Davidia Vilmoriniana*.

Oxford, Botanic Garden.—Plants of *Primula floribunda*.

Pretoria, Department of Agriculture, Division of Plant Industry.—A collection of seeds of *Sorghum* spp. and varieties for trial.

Queensland Forestry Service, Brisbane.—Cuttings of *Salix* spp.

Rotterdam, Botanic & Zoological Gardens.—Seeds of *Victoria regia*.

Rostock, Botanic Gardens, Germany.—Plants, including *Lagarosiphon muscoides*.

Richmond Park.—Hardy shrubs.

Sydney, Botanic Gardens.—Seeds of *Cupressus* spp.

Seychelles, Department of Agriculture.—Seeds of *Attalea cohune*.
Trinidad, Imperial College of Tropical Agriculture.—Seeds and plants of Musas.
Trinidad, Department of Agriculture.—A collection of *Piper nigrum* vars.
Timaru, Parks Department, New Zealand.—A collection of seeds of trees and shrubs and of *Kniphofia* spp.
U.S. Department of Agriculture, Washington.—Seeds of *Phoenix reclinata*.
Wisley, Royal Horticultural Society's Gardens.—A large collection of hard-wooded greenhouse and herbaceous plants.

Mr. H. Allander, Stockholm.—Seeds of European species of *Rubus*.
Mrs. M. C. Allison, Kakamega, Kenya.—A small collection of tulips.
Mr. H. F. Buxton, Durness by Lairg, N.B.—Rhododendrons for trial on magnesian limestone.
Dr. F. Boergesen, Copenhagen.—Hardy herbaceous plants.
Mr. G. W. Blathwayt, Porlock.—Plants and cuttings, including a collection of *Pelargoniums*.
Miss C. Buisman, Baarn, Holland.—Grafts of *Ulmus* spp.
Lt.-Col. F. R. S. Balfour, Dawyck.—Hybrid poplars and hardy trees and shrubs.
Hon. Lady Alicia Cecil, Poole.—Plants of *Enkianthus* spp. and *Acer pentapomicum*.
H.R.H. Duke of Connaught, Bagshot.—Plants of *Aesculus indica* and *Wistaria multijuga* var. *alba*.
Col. Stephenson Clarke, Haywards Heath.—Plant of *Taxus adpressa* var. *aurea*.
Mr. W. S. Chamberlain, Twickenham.—Plants, including *Meconopsis grandis*.
Messrs. Dobbie & Co., Ltd., Edinburgh.—Seeds, including *Lilium* spp.
Dartington Hall, Gardens Department, Totnes.—Grafts, plants and cuttings of hardy trees and shrubs.
Donard Nursery Co., Newcastle, Co. Down.—A collection of seedling *Acer* spp.
Lady Thiselton-Dyer, Bere Alston.—A collection of trees and shrubs.
Messrs. C. Engelmann, Saffron Walden.—A collection of Sempervivums.
Mr. T. H. Everett, New York.—A collection of stove and greenhouse plants.
Mr. G. A. Frick, Los Angeles.—Plants and cuttings of *Euphorbia* spp.
Mr. K. A. Fotsch, Hunibach, Switzerland.—Plants of *Begonia* spp.
Mr. S. H. Griffin, Farnham.—Seeds of succulents.
Dr. P. L. Giuseppi, Felixstowe.—A collection of alpines.

Capt. R. H. Griffin, Merchant Seamen's Institution, Belvedere.—A large collection of trees and shrubs.

Dame Alice Godman, Horsham.—Plants and seeds, including *Kniphofia Galpini* and *Meconopsis nepalensis*.

Mr. B. Hurst, Prince Edward Island.—A collection of *Hedera Helix* vars.

Lt.-Col. H. B. Holt, Military Headquarters, Burao, British Somaliland.—Seeds and plants of *Mesembryanthemum edule*, *M. deltoides* and *M. validum*, for growing as sand-binding plants (presented by Major A. Dorrien-Smith from Tresco Abbey).

Messrs. Hillier & Sons, Winchester.—Hardy trees and shrubs.

Marquess of Headfort, Kells, Co. Meath.—A collection of hardy trees and shrubs.

Dr. W. A. Harrison, Burnie, Tasmania.—Buds of *Glycyrrhiza glabra*.

Sir Arthur Hort, Andover.—*Pelargonium* spp., and alpines.

Capt. Collingwood Ingram, Benenden, Kent.—Plants of *Rhododendron burlutescens*.

H.M. The King, Windsor & Sandringham.—Plants of *Aesculus indica*.

Mr. B. H. Keall, Chelmsford.—A collection of fern spores.

Mr. H. Q. Levy, Jamaica.—A collection of orchids.

Sir William Lawrence, Dorking.—Hardy trees and shrubs.

Mr. C. H. Lankester, Surbiton.—Herbaceous plants ; a collection of orchids and succulents.

Messrs. W. J. Marchant, Wimborne.—Trees and shrubs.

Earl of Malmesbury, Christchurch.—Plants of *Ixora* spp.

Mr. E. R. Magnus, Gothenburg.—Plants of *Disa tripetaloides* and *D. Luna*.

Sir F. W. Moore, Rathfarnham, Dublin.—Rhododendrons.

Major Sir George Manners, Woodbridge.—A collection of conifers.

Hon. H. D. McLaren, Bodnant, N. Wales.—Greenhouse plants and *Primula Dickieana*.

Sir F. A. Newdegate, Nuneaton.—Plants of *Dianella tasmanica*, *Libertia pulchella*, etc.

Col. G. Napier, Horeham Road, Sussex.—A collection of *Lilium* seeds.

Mr. N. S. Pillans, Rosebank, Cape Province.—A collection of *Lilium* seeds.

Dr. R. H. Pulleine, Adelaide.—A collection of Euphorbias.

Mrs. N. E. Parry, Newton Abbot.—Plants raised from seeds collected in the Lushai Hills, Assam.

Major A. Pam, Broxbourne.—A collection of trees and shrubs, and tubers of *Gloxinia maculata*.

Mr. R. H. Rumsey, Dundas, New South Wales.—A miscellaneous collection of plants in wardian case, including *Hoya* spp.

Messrs. L. R. Russell, Ltd., Richmond.—A collection of *Nepenthes*, and stove plants.

Major L. de Rothschild, Exbury.—Plants, including *Cladrastis Wilsonii*, and *Cytisus Battandieri*.

Hon. Mrs. E. Ryder, Beaulieu.—Succulents, bulbs and seeds of *Liliums*, and greenhouse plants.

Royal Army Veterinary Corps, Woolwich.—Hardy trees.

Major F. C. Stern, Goring-by-Sea.—Plants, including *Hebe* spp., *Kniphofia Northiae*, and seeds of *Lilium* spp.

Mr. J. E. H. Stooke, Hereford.—Seeds of *Nomocharis* spp. and *Lilium* spp.

Mr. J. L. Smith, Sydney.—Cuttings of *Populus tremula*.

Mr. J. B. Stevenson, Ascot.—Plants of *Acer pentapomicum*.

Major F. J. Stayner, Bath.—A collection of Mesembryanthemums. alpines, hardy trees and shrubs.

Messrs. Sutton & Sons, Slough.—Hardy plants, including *Meconopsis regia*, and *M. grandis*.

Mr. A. Scott, Carluke, N.B.—A collection of *Fragaria* spp.

Messrs. W. C. Slocock, Woking.—Grafts and cuttings of hardy trees and shrubs.

Mr. Rees Thomas, Port Talbot, S. Wales.—Herbaceous plants and seedling Rhododendrons.

Mr. R. D. Trotter, Oakley.—Plants, including *Stewartia koreana*.

Prof. A. G. Tansley, Oxford.—Plants of *Hevea brasiliensis*.

Underground Railways, London.—Seeds and cuttings of hardy trees and shrubs.

Sir O. Warburg, Epsom.—Hardy trees and shrubs.

Messrs. F. Gomer Waterer, Woking.—Grafts and cuttings of hardy trees and shrubs.

Mr. E. H. Wilding, Stoke Poges.—Plants, including *Cornus Kousa* var. *chinensis*.

Mr. J. Cromar Watt, Aberdeen.—Hardy plants, including Camellias in variety.

Mr. J. C. Williams, Caerhays.—Plants of *Erica Pageana*.

Mr. C. R. Wadman, London.—Alpines.

Messrs. R. Wallace & Co., Ltd., Tunbridge Wells.—Plants and grafts of hardy trees and shrubs.

Mr. J. J. M. van Zyl, Ladysmith.—Seeds of British trees.

Messrs. K. Yashiroda, Ltd., Japan.—A collection of conifers.

Mr. K. Zwicky, Hunibach, Switzerland.—Seeds of *Primula* spp.

National Pinetum at Bedgebury.

Most of the trees continue to make satisfactory progress and many are growing very rapidly. Some losses occurred during the year owing to attacks by fungus diseases and insect pests, and several trees that had been injured by the severe spring frosts of 1926, '27 and '28, and that showed no signs of recovery, were destroyed and replaced. On the other hand several young trees that had lived after severe freezing in those years, but had remained in a stunted condition, formed short, erect, vigorous shoots from dormant stem

buds and now appear as though they may resume the normal rate of growth. It is also satisfactory to find that grafted plants of *Abies nobilis* var. *glauca*, which from 1925 gave little evidence of forming good leading shoots, have at last responded to branch pruning and formed good erect leaders, in one instance 18 inches long.

A little browning from the effects of late frost occurred on early shoots, but generally growth was late and little harm was done. The ill effects of a mild winter temperature are very apparent in the case of *Larix sibirica*. In December, 1931, growth buds were bursting and the shoots were quite green by the middle of January. Later on, both young shoots and leaves were badly cut by cold winds, and, as the same thing has happened over a succession of years, the trees are poorly developed when compared with other species of similar age.

March was a trying month, for very cold winds accompanied by frost were experienced throughout several successive days. The foliage of several species of *Pinus* was injured; one young tree of *P. patula* was killed outright, and young shoots of that species, and of *P. caribaea*, were seriously injured. In one place a specimen of *Sequoia sempervirens* 50 years old and 60 or 70 feet high was browned from bottom to top as though it had been scorched by fire.

Thermometers have been installed in four different parts of the Pinetum and daily records are kept in accordance with work in that direction carried out by the Forestry Commission. Although the Pinetum is only 50 acres in extent it has already been found that the temperature in different parts may vary as much as 4 degrees on cold nights and warm days.

Green spruce aphis (*Aphis abietina*) has been very troublesome for several years and it bred on numerous species of *Picea* throughout the winter of 1931–'32, being particularly prominent from January to April. Soon after the hot, dry weather began in June it was noticed that the pest was less in evidence and by the middle of July it had practically disappeared. A few were seen in November, but many less than in previous years. *Dreyfusia* is still present on various *Abies* but its spread appears to have been checked by spraying. Outbreaks of minor insect pests have been noticed, but by prompt attention to spraying and other means of destruction they have not made serious headway. The larvae of the moth *Dichomeris marginella*, reported last year as attacking various kinds of juniper, have again been active, but in smaller numbers, whilst injury by the larch shoot moth has again decreased.

Fungus diseases have become more serious, particularly the honey fungus, *Armillaria mellea*, and several well developed young trees have died after infestation. The wet, mild autumn weather was peculiarly favourable for the spread of this disease, which was known to be present on the old pine butts and roots, and fructifications were found in all directions. It is more than probable that losses will be experienced from this disease for many years. For the first time

larch canker, *Dasyscypha calycina*, was found on the young larch trees, the Silesian form of common larch being the chief sufferer. The attack so far is not of a serious nature and appears to be confined to a few branches. As a larch wood badly infested by this fungus is situated a few hundred yards away, young trees can hardly escape altogether.

Undergrowth was particularly vigorous and an effective effort was made to clear the ground of bracken and grass during early autumn in order to reduce the possibility of damage by fire. As the bracken appears to be increasing in vigour, an attempt to kill some of it by beating down the young undeveloped leaves is to be made next spring. A good deal of dead wood has been removed from old trees and dead butts are being cleared from avenues as time allows. Overgrown plants of *Rhododendron ponticum* have also been cut back. Box drains made of rough oak planks have been laid in the ditches where they cross avenues, and the unequal ground level in such places is gradually being built up by rotting grass and other vegetation.

A start has been made in removing some of the lower branches from the larches, the vigorous growing pines, and from other trees, the idea being gradually to remove the branches while small until the desired height of clear trunk has been attained, rather than to leave all the lower branches to develop until they have attained a considerable size, as is often done with coniferous trees planted for decorative purposes.

Numerous conifers were taken to Bedgebury from Kew in the autumn and about 70 plants were purchased as additions or replacements. A number of water-lilies from Kew were planted in Marshall's Lake in April ; they flowered well during the summer and were much admired by visitors. Two lorry loads of large Rhododendrons were sent from Kew in November and it is hoped to send some more in the spring. An effort is being made to build up a collection of Rhododendrons in place of weedy undergrowth, and gifts of the more vigorous species will be welcomed from anyone who may be overstocked with such plants.

Numerous persons interested in conifers have been given facilities for inspecting the collection during the year. A party of Student Gardeners was taken from Kew in April in connection with the course of lectures on arboriculture, and some 40 members of the Royal English Forestry Society visited the Pinetum in June. The general opinion of those who have paid visits seems to be that the Pinetum and adjacent forest plots are developing into an important educational area for students of horticulture and forestry.

It is with great regret that the death, in November, of Mr. H. A. Pritchard, O.B.E., Assistant Commissioner for England and Wales, under the Forestry Commission, has to be recorded. Mr. Pritchard had been a member of the committee responsible for the formation and upkeep of the Pinetum and Forest Plots since its earliest days,

and had a great deal to do with the early negotiations and arrangements. His keen interest in the development and progress of the Pinetum and his active assistance at all times will be greatly missed by his colleagues.

The Museums.

As in past years the work in the Museums has been very largely concerned with answering questions of visitors and correspondents regarding the economic products of plants and the identification of specimens, and with assisting persons who have made prolonged visits for the studying of special subjects. Questions connected with essential oil plants and the possibility of their successful cultivation in various Colonies have been very numerous, and many requests have been made for suggestions as to crops that might be used to replace or supplement others that could not under present conditions be matured and marketed at a price that ensured a reasonable financial return to the producer.

Such crops are difficult to find, for it is very easy to spoil a moderately lucrative market by a little over-production. Further, a good deal of experimental work may be necessary with crops new to a country before an attempt at their cultivation on an extensive commercial scale is warranted, and farmers are usually on the look-out for something that will yield an easily grown, paying crop within a few months from the time of sowing.

Numerous specimens have been dried and added to the Arboretum Herbarium, and pressure on space has been relieved by additional presses and rearrangement. Good progress has been made in the preparation of a collection of dried branch specimens of conifers, with cones, to send to Bedgebury at some future time.

Museum No. 3, Colonial Timbers, has been redecorated throughout. The redecoration of such a building involves a good deal of work, for all the lighter specimens and many of the heavier planks have to be moved. The opportunity was taken of making such rearrangements as were necessary and of replacing some of the poorer specimens. Exhibits representing various Colonies are gradually being renewed and the Tasmanian government is at present considering the replacement of those Tasmanian timbers that have deteriorated with age. By permission of the Director a collection of lily bulbs has been prepared in preservative liquid for purposes of comparison at the Lily Conference to be held under the auspices of the Royal Horticultural Society in 1933.

During the year Mr. J. H. Holland contributed articles to the Bulletin on Ledger Bark and Red Bark, and on "Oiticica" (*Licania rigida*). Mr. J. H. Turner carried out research into the longevity of seeds, and a review of the subject will shortly be published in the Bulletin. In several instances certain leguminous seeds were found to be viable after storage in museum jars for from 60 to 90 years.

The Keeper attended the annual meeting of the Association of Superintendents of Parks and Curators of Botanic Gardens, held at Liverpool in July, as the representative of the Ministry of Agriculture and Fisheries. By invitation of the Association he gave an address on problems connected with trees planted along the sides of streets and roads. He also attended the annual meetings of the Museums Association at Birmingham and the Council for the Preservation of Rural England at Norwich. He has continued to act as Executive Officer for the Pinetum at Bedgebury.

During the year a large number of photographs and lantern slides, mainly of tropical agricultural crops, was acquired by the Bentham Trustees from Dr. C. A. Barber of Cambridge; many of these have been incorporated with slides already at Kew, and the remainder have been prepared for distribution to other institutions.

Presentations to Museums.—Mr. T. Hedley Barry, 84, Fetter Lane, E.C.4.—Collection of hard resins and copals used in the preparation of his book "Natural Varnish Resins" (1932).

Mr. H. Bruins-Lich, Trinidad.—Sample of Coffee grown in St. Helena.

Mr. A. A. Cavanagh, Liebig's Yerba Maté Plantation, Playadito, Corrientes, Argentine Republic.—Sample of Paraguay Tea.

Miss L. E. Cheesman, 63, Longridge Road, S.W.5.—Specimen of wood of *Santalum austro-caledonicum*.

Dr. L. Cockayne, C.M.G., F.R.S., Wellington, New Zealand.—Ten lantern slides showing different types of vegetation in New Zealand.

Mr. C. T. Collinson, 35, West Cromwell Road, S.W.5.—Two photographs of *Welwitschia mirabilis*.

Mr. E. Fleming, 1006, Government Street, Victoria, B.C.—Photograph of *Cornus Nuttallii*.

The Forestal Land, Timber and Railways Company, Ltd., 15, St. Helen's Place, E.C.3.—Fifty named specimens of Argentine woods.

Mr. J. C. F. Fryer, Pathological Laboratory, Harpenden.—Seeds of *Chrysanthemum cinerariaefolium* from plants raised from Japanese and Swiss seeds.

Dr. Alfred Hay, bequeathed by the late, per The Chartered Bank of India, Australia and China.—Collection of wood specimens and drawings of plants.

Dr. T. A. Henry, The Wellcome Chemical Research Laboratories, 183–193, Euston Road, N.W.1.—Sample of oil and seeds of *Oncoba spinosa*.

Miss M. S. Johnston, 276, Kew Road, Kew.—Wooden figure of Boatman, XIth Dynasty, from the Museum, Cairo; spoon made of sycamore, ash tray and carved dog manufactured in England; also a specimen of old Tunbridge ware.

Messrs. Wm. Marshall & Son, Ltd., 317, Holloway Road, N.7.—Plank of *Zelkova crenata* from a tree grown near Staines.

Pernambuco, H. M. Consul.—Fruits, leafy branches and unopened flowers of " Oiticica " (*Licania rigida*).

Sir David Prain, The Well Farm, Warlingham.—Photographs of *Pinus contorta* var. *latifolia*.

Princes Risborough, Forest Products Research Laboratory.—Collection of 38 hand specimens of wood, and 7 boards of Empire timbers.

The Conservator of Forests, Utilization Circle, Ahlone, Burma.—420 hand specimens of Burmese woods.

Mr. H. N. Ridley, 7, Cumberland Road, Kew.—Walking sticks of *Randia densiflora*, *Arenga saccharifera* and *Diospyros macrophylla*.

Jodrell Laboratory.

The routine work of the laboratory has been mainly concerned with the examination of miscellaneous material, consisting chiefly of timbers, fibres, barks and seeds, with a view to identification from a study of the anatomy.

The collection of microscopical slides of wood-sections, seeds, etc., the formation of which was described in last year's report, has grown steadily. The new slides, most of which have been prepared for comparison with material received for identification, are from a wide range of families. Exchange of slides has been effected with the Imperial Forestry Institute, Oxford, over 150 slides having been received during the year. These exchanges are of great value, since, in addition to increasing the size and therefore the utility of the collections, they sometimes lead to the discovery of wood-specimens in our collections whose identity has been previously incorrectly determined.

The investigation of the structure and taxonomy of some little-known scented woods from the East, mentioned in last year's report, has been concluded, and an illustrated account is published in *Kew Bulletin*, 1933, 3.

At the suggestion of the Director, the anatomy of the phyllode-bearing species *Oxalis Herrerae* R. Knuth and *O. bupleurifolia* St. Hil. was studied. The material of *O. Herrerae* was kindly supplied by the Director, who had collected it some years ago in Peru. An account of this work is to be published shortly in the " Annals of Botany."

In collaboration with Dr. Sprague the anatomy of the leaves and axis of the genera *Barnhartia* and *Diclidanthera* and of certain Polygalaceae was studied in order to determine whether the structure confirmed Dr. Sprague's suggestion, based on gross morphological features, that the Diclidantheraceae and Polygalaceae are closely related to one another. Evidence which favours this suggestion was found.

In connection with the experimental work at Potterne under the direction of Mr. Marsden-Jones and Dr. Turrill, it has been decided that a study of the anatomy of *Centaurea*, carried out at the same time as the genetical and transplant experiments on that genus,

would yield useful results. A start has been made with this work, attention having been directed especially to the nature of the hairy covering of the basal leaves of plants grown on different types of soil at Potterne. It is hoped that this work may be extended in the spring when further fresh material will be available for study.

The most constant visitor this year has been Mr. L. A. Boodle, the late Assistant Keeper of the laboratory. Most of his time has been spent in identifying collections of material made by excavators in the Egyptian tombs. In addition, his wide knowledge of botanical literature and of plant anatomy has been of the greatest assistance in dealing with difficult material received for identification.

The following visitors have also worked at the laboratory during the year :—

Mr. D. V. Daran. Mycology.

Mr. R. N. Aldrich-Blake. Seed germination, and anatomy of root nodules of *Casuarina*.

Mr. G. B. E. Hasselberg. Fixing material for anatomical work.

Mr. H. T. Holland. Food and Drugs.

Mr. E. R. Goodliffe. Elementary Anatomy, etc.

Miss C. L. Perry. Anatomical preparations with the wood-cutting microtome.

The Herbarium.

The outstanding event of 1932 was the completion and opening of the new wing (*see* Annual Review, 1931, 28). The heating apparatus and electric wiring were completed early in the year and the furniture was delivered during the summer months. The furniture, including stools, tables, large presses and specimen cabinets, is made of steel, the first three being covered with rubber and painted dark green.

The new wing (Wing A) was ready for occupation by the autumn of 1932, and the transference into it of part of the collections and the redistribution of the remainder in the two old wings was carried out without mishap, under the general supervision of the Deputy Keeper, with the aid of labour supplied by H.M. Office of Works. In order to avoid risk of damage or misplacement of material, the work of taking out and putting away the specimens was undertaken by members of the botanical staff. The specimens were conveyed in special containers, which were wheeled to their destination on narrow-gauge trolleys with quietness and admirable celerity. The actual removal of herbarium specimens was completed within six weeks (October–November), but the preparation of new covers and the re-labelling of cabinets will occupy some months.

The total number of shelves-full of herbarium specimens moved was about 36,000, representing over 2,000,000 sheets. These were redistributed among the 50,000 shelves now available in the three wings, space for expansion being left at the top of each vertical row of shelves, at the outside end of each block of cabinets, and at both ends of each floor. The carpological collections are being

placed in the outside row of shelves in each block, adjacent to the corresponding herbarium material. The collection of drawings, which is being remounted on herbarium sheets of standard size, will be placed in cabinets on the same floors as the corresponding specimens, thus facilitating comparison.

The system of Bentham and Hooker has been retained for the general arrangement of the collections. Wing A (the new west wing) contains the Dicotyledons from Ranunculaceae to Compositae (*Zoegea*) inclusive. Wing B (south or centre wing) contains the remainder of the Dicotyledons from Compositae (*Centaurea*, including *Leuzea*) onwards, the Gymnosperms and the Orchids. Wing C (east or old wing) contains the remaining Monocotyledons, the Cryptogams, and the Ecological and Genetical herbaria. For convenience of reference the blocks of cabinets have been numbered consecutively throughout the three wings.

The additional space now available has made it possible to incorporate a large accumulation of specimens which had been kept in store owing to the congested state of the herbarium.

Europe, North Africa, and the Orient.

Owing to the very large increase of new collections little was accomplished during the year towards the incorporation of material from the stores. Over 10,000 sheets were mounted and poisoned and the majority laid in, but these were mainly specimens received during the current and past two or three years. Over 8,500 specimens have been received for identification in addition to over 2,500 others which were sent named.

The following genera, amongst others, have been " written up " according to recent monographs or standard lists or floras:— *Linum*, *Matthiola*, *Iberis*, *Glaucium*, *Senecio*, *Pulmonaria*, and *Rhamnus*. The Rev. H. J. Riddelsdell kindly revised critically the *Rubi* from Leicestershire, Devon, and Sussex, and Dr. K. Rechinger determined a considerable part of the genus *Rumex*.

Many members of the Staff have again contributed specimens which have helped to fill the gaps in our series of British plants ; in addition the following have also presented material : Mr. B. G. C. Bolland (Devon), Mr. A. K. Jackson, a valuable set of 266 plants from Alderney (supplementing collections previously received from Sark and Jersey), Mr. J. R. Sealy, Mr. A. W. Trethewy (Rutland), Mr. E. Thurston (Cornwall), Mr. C. H. Wright (Devon), Col. H. H. Johnston (Orkney), Miss M. E. Edmonds (Rutland, etc.), Mr. P. M. Hall (various), Mr. E. M. Marsden-Jones (Wiltshire), and Mrs. C. Sandwith (various). The Continental collections were enriched by specimens received from Sir Oscar Warburg (*Cistus*), the Royal Horticultural Society per Dr. O. Stapf (cultivated plants), Mr. J. W. Wyatt (Austria and Switzerland), Mrs. E. W. Moore Kennedy (Balearic Islands) and Dr. H. Lindberg (Spain).

A set of all the known species of *Aegilops*, prepared from the collection which is in cultivation at Reading University, was presented by Professor John Percival.

From the Balkan Peninsula valuable collections have again been received and the recent additions are proving of great use in supplementing the fairly complete sets of many of the older collections. Dr. K. Maly continued to send in exchange plants from Bosnia and Prof. N. Stoyanoff from Bulgaria. Mr. S. C. Atchley continued his most valuable donations (nearly 700 numbers during the year) from Crete and Greece and Mr. H. G. Tedd from Western Thrace. Mr. H. G. Chick sent two collections from Greek Macedonia and one from the Athos Peninsula. Dr. G. Samuelsson presented a set of well-dried plants from Greece. The Rev. and Mrs. H. P. Thompson sent a collection of 250 sheets collected by them in Montenegro, Novi Pazar, and Bosnia. Another valuable contribution consisted of 1,350 sheets, being the Kew share of a collection made during a visit by Messrs. A. H. G. Alston and N. Y. Sandwith to Greek Macedonia.

In addition the following collections were received from various parts of Europe: *Presented*: Andropogoneae by the Botanical Garden of the U.S.S.R. Academy of Sciences, Leningrad; Czechoslovakia, by Dr. K. Domin, Flora Czechoslovenica Exsiccata, Century iii, and by Dr. J. Podpěra, Flora Exsiccata Reipublicae Bohemicae Slovenicae, Century VII. *Purchased*: Mr. P. Aellen, Swiss plants; Mr. J. Wagner, Tiliae exsiccatae criticae, Fascicle ii, numbers 51–100.

From the Orient sixteen large consignments of plants collected by Mr. E. R. Guest in Iraq have been received. These consisted of a sufficient number of well-dried specimens to make a number of duplicate sets for exchange. The collection, which is being continued, contains several new species and much critical material. The late Dr. G. C. Druce presented a set of plants from Cyprus. Collections from Palestine have added to the value of our material from this country and include Flora Palaestinae Exsiccata, Century ii, presented by the Hebrew University, Jerusalem, specimens for identification from the Independent Biological Laboratories, Tel Aviv, and Hauran plants collected by J. E. Dinsmore purchased from Fr. Vester & Co. Further specimens collected by Haradjian in Syria, completing the set purchased in 1913, were received from the Conservatoire et Jardin Botaniques, Geneva. Fascicles ix-xii of Herbarium Florae Caucasicae were presented by the Botanical Garden of the U.S.S.R. Academy of Sciences, Leningrad. Dr. P. L. Giuseppi and Mr. E. K. Balls explored little-known parts of Persia and presented useful collections for identification. A set of Anatolian plants was purchased from Prof. J. Bornmüller, and 350 sheets have been received from the Egyptian Ministry of Agriculture for identification.

From North Africa, Dr. H. Lindberg presented an excellent set of plants collected by him in Morocco, and a series of Algerian and Moroccan plants was purchased from M. A. Faure.

Research and Publications.—On the Flora of the Nearer East : XI–XIII (*K.B.* 1932, 193, 248, 450).

Two plants new to the Bulgarian Flora (Bull. Soc. Bot. Bulg. v. 78 : 1932).

Variation in Anemone nemorosa (Journ. Bot. December, 1932).

Asia.

China and Northern Asia.—In addition to the large amount of critical garden material which has been named, several extensive collections have been identified. The most important of these were the Gentians collected by Mr. J. F. Rock on his last two expeditions to Asia, received for critical study from the U.S. National Museum, Washington ; the Gentians collected by Mr. Y. Tsiang in Kweichow, received from the Metropolitan Museum of Natural History, Nanking in 1931, and those collected by the Rev. H. French Ridley in Chinese Turkestan. The authorities of the British Museum (Natural History) kindly sent on loan specimens of *Gentiana* collected in Nepal by Capt. Lall Dhwoj, from which a new species was described.

The following collections were also received :—

Presented : by the Arnold Arboretum, Harvard University (coll. C. Y. Chiao and J. F. Rock), the Fan Memorial Biological Institute, Peiping (*Dioscorea*), the Metropolitan Museum of Natural History, Nanking (coll. Y. Tsiang), and by Mr. R. H. Mobbs.

Purchased : Mr. W. J. Eyerdam, Kamchatka plants.

Research and Publications.— A critical study has been made of all the material of the genus *Cyananthus* which has been brought to this country since the publication of the " Revision of the genus Cyananthus " (*K.B.* 1924, 241), and the results of this investigation will appear in a further paper on this genus.

The Chinese and Himalayan Gentians in Cultivation (Journ. Roy. Hort. Soc. lvii. 188 : 1932).

A Revision of the genus Leycesteria (*K.B.* 1932, 161).

On the Identity of Aconitum acaule Diels (*K.B.* 1932, 241).

Indo-Malaya.—Considerable progress was made with laying in the accumulations in the store of the specimens from the Malay Archipelago and the Philippine Islands referred to in last year's report. The additions of the year which have been determined have also been incorporated in the Herbarium.

Numerous collections were received from the Botanic Gardens at Singapore and Buitenzorg, and from the Forest Department, British North Borneo, and a set of plants collected by Mr. P. Richards, who accompanied the Oxford University Expedition to Sarawak, was presented. Smaller collections were presented by the Imperial Forest Botanist, Dehra Dun ; Professor E. Barnes, of the Christian College, Madras ; Col. C. H. Stockley and Mr. B. O. Coventry from Kashmir ; the Rev. W. J. L. Wenger from the South Lushai Hills of Assam ; and Mr. P. V. Mayuranathan, Botanical Assistant to the Superintendent of the Government Museum, Madras. Professor

Barnes' specimens from the Nilgiri Hills are exceptionally good, being accompanied by valuable notes.

Several small collections were identified for correspondents in North and South India and some progress was made in determining the collections made in North East Assam by Capt. Kingdon Ward and in the Garo Hills by Mrs. N. E. Parry, the former yielding three new species, and the latter one new species and one new variety.

Sheets of South Indian grasses, kindly lent by the Cambridge University Herbarium, the Botanical Gardens, Breslau, and the Royal Botanic Garden, Edinburgh, in connection with the preparation of the Flora of the Presidency of Madras, were received and are proving most useful.

Miss M. M. Whiting has again given valuable help in subdividing the material in the Indo-Malayan region and in rearranging the species at the same time, in conformity with recent work. She has, moreover, written up the sheets of Malayan Dipterocarpaceae in accordance with Foxworthy's recent monograph of this group.

The following collections were also received :—

India.—*Presented* : Burma, by Dr. A. F. G. Kerr and Mr. C. E. Parkinson ; Kashmir, by Prof. R. R. Stewart ; United Provinces, by Mr. P. Maheshwari ; Waziristan, by the Rev. E. Blatter.

Malay Peninsula.—*Presented* : by the Forest Research Institute, Kepong, and by Dr. A. F. G. Kerr.

Indo-China.—*Presented* : Laos, by Dr. A. F. G. Kerr ; Siam, by Mrs. D. J. Collins, Mr. H. B. Garrett and Dr. A. F. G. Kerr (coll. A. F. G. Kerr, Noi Put and M. C. Lakshnakara).

Philippine Islands.—*Purchased* : Mr. C. A. Wenzel.

Research and Publications.—The Koenig Collection in the Lund Herbarium (*K.B.* 1932, 49).

Contributions to the Flora of Burma : X (*K.B.* 1932, 103).

Contributions to the Flora of Siam, by W. G. Craib, Additamenta XXXIII–XXXVII (*K.B.* 1932, 137, 276, 330, 425 and 487).

Contributions towards a Flora of British North Borneo : I and II (*K.B.* 1932, 176 and 292).

Plants new to Assam : IV and V (*K.B.* 1932, 198 and 248).

New or little-known Plants from South India : I (*K.B.* 1932, 245).

Two New Species of Dentella (*K.B.* 1932, 289).

The genus Mariscopsis (*K.B.* 1932, 457).

Africa.

There was no diminution in the amount of material received for identification, over 10,000 specimens being received from Tropical Africa alone during the course of the year. The bulk of this was from East Tropical Africa. It was quite impossible to deal promptly with such a large amount of material with the staff available, and it is regretted that the work of identification is considerably behindhand.

About 11,000 tropical and South African plants have been mounted during the year.

With regard to the African Floras in course of publication, the MS. of Part vi. of Vol. ix. of the Flora of Tropical Africa (Gramineae) has been completed, and includes the important genus *Pennisetum*.

The MS. of the last part of the Flora of West Tropical Africa (Monocotyledons) has been prepared, leaving the Orchidaceae and Gramineae to be completed. Considerable difficulty has been experienced in the elaboration of the Palmae owing to insufficient material, and specimens with field notes and photographs are much needed to complete the Kew collections. Dr. J. M. Dalziel continued to give his valuable help in preparing the Appendix to this Flora which deals with economic plants and vernacular names. It is gratifying to learn that the first three Parts of the Flora are in constant use by the French botanists when studying the plants in French West Africa.

The elaboration of the Cycads having been completed, the MS. of a Supplement to the Flora Capensis containing an account of all South African Gymnosperms has been sent to the press.

The second part of Dr. J. Burtt Davy's " Flora of the Transvaal and Swaziland " (Malvaceae to Umbelliferae) was published in July, much of the work entailed having been carried out at Kew over a period of many years. This part should be welcomed by South African botanists, particularly for the account of the Leguminosae, which occupies about one-third of the whole.

West Tropical Africa.—Owing, no doubt, to the publication of the third part of the Flora of West Tropical Africa, which concludes the account of the Dicotyledons and enables botanists in West Africa to name their own collections, only about 1,000 specimens were received from the West African Colonies. These consisted mainly of critical Dicotyledons and Monocotyledons, as botanists have kindly helped by sending material of the latter in order to assist in the working out of that group for the last part of the Flora. From Sierra Leone Messrs. F. C. Deighton and J. W. D. Fisher of the Department of Agriculture have been the chief contributors. Gold Coast plants have been received from Dr. F. R. Irvine and from Messrs. T. Lloyd Williams and W. C. Fishlock of the Department of Agriculture. Nigerian plants collected by Messrs. F. D. Golding, L. H. Saunders (grasses), and C. B. Taylor (grasses) have been received from the Agricultural Department, and by Messrs. J. D. Kennedy, W. D. MacGregor and A. F. Ross from the Forestry Department. Miscellaneous specimens have been presented by Dr. J. Burtt Davy of the Imperial Forestry Institute, Oxford.

Cameroons and Congo.—The poor representation of the Congo flora has been somewhat remedied by the acquisition of further fine collections of Compositae communicated by the Director of the Congo Museum, Tervueren, Belgium. Amongst them were several

novelties, descriptions of which have been published in the Rev. Zool. Bot. Afr. xxiii. 36–42 (1932). Professor W. Robyns presented in exchange about 350 duplicates and an interesting series of Sorghums, and Mr. P. T. L. Putman of Avakubi sent a small collection for naming. A mixed collection, including several new species of Mosses, from the Cameroons Mountain was received from Miss M. Steele.

North-East Tropical Africa.—Major G. Aylmer presented a collection from Erkawit and a series of over 200 specimens was named for Mr. A. P. G. Michelmore and Mr. F. W. Andrews, gathered in connection with their researches on the locust problem in the Sudan. Three small but very interesting collections were received from Miss M. Steele (Gebel Marra), Mrs. D. Macintosh, from the Wau district in the Bahr el Ghazal Province, and from Capt. B. Godfrey-Faussett, from the Western border of Somaliland while engaged on the British Somaliland-Ethiopia Boundary Commission.

East Tropical Africa.—Members of the Agricultural Department, Uganda, have again been active, and specimens have been received from Messrs. P. Chandler, G. L. R. Hancock, C. G. Hansford, C. Hazel, and others ; and also from the Forestry Department from Messrs. N. V. Brasnett, W. J. Eggeling, C. M. Harris, and others. Miss E. R. Napier, of the Coryndon Memorial Museum, Nairobi, has forwarded for determination some 1400 specimens collected in Kenya by herself, Miss C. Harvey, Mrs. Brodhurst Hill, Mrs. Chater Jack and others. The Agricultural Department, Kenya Colony, has presented small consignments collected specially by Messrs. D. C. Edwards and C. A. Thorold, and the Forestry Department, Kenya Colony, again forwarded interesting material collected mainly by Messrs. I. R. Dale and H. M. Gardner. From Mount Elgon additional material was received from Major E. J. Lugard, and also some very interesting specimens, especially Orchidaceae, from Mrs. D. R. Tweedie.

The chief collectors in Tanganyika Territory were Messrs. B. D. Burtt and G. W. St. Clair Thompson of the Department of Tsetse Research, and A. E. Haarer and V. F. Jessel of the Department of Agriculture. Valuable contributions collected by Messrs. H. E. Emson, H. E. Hornby, P. J. Greenway, N. V. Rounce, and R. R. Staples were received from the East African Agricultural Research Station, Amani.

Our botanical knowledge of the mountainous parts of the southern portion of Tanganyika Territory has been increased during the year by three valuable collections. Mr. R. M. Davies, of the Agricultural Department, made a trip to the Rungwe and Elton Plateau, and forwarded an interesting set of specimens with sketch maps. At a later date Rear-Admiral H. Lynes made a topographical and ecological survey in the Iringa district and brought home a useful collection of specimens accompanied by detailed maps, while additional material from the same regions was received from Mr. G. W. St. Clair Thompson (see p. 4).

South Tropical Africa.—A further century of plants collected by Senhor A. F. de Gomes e Sousa in Portuguese East Africa was received from the Director of Agriculture. From Southern Rhodesia a large number of Cyperaceae was communicated by the Secretary of the Department of Agriculture, grasses by Miss S. M. Stent, and miscellaneous plants by Mr. F. Eyles, Miss E. G. Walter and Miss R. J. Myres, and by Mr. D. R. Rosevear of the Forestry Department. A large collection, which included many grasses, was forwarded by Mr. C. G. Trapnell from Northern Rhodesia and a miscellaneous collection from Nyasaland was presented by Mr. E. Lawrence of the Department of Agriculture. Various South Tropical African plants (mostly herbs) were received from Dr. J. Burtt Davy, of the Imperial Forestry Institute, Oxford, and over 100 Orchids collected by the members of Lund University, during their expedition to South Africa and Southern Rhodesia, were forwarded for naming by Mr. T. Norlindh. Mr. J. Fish presented a collection of specimens, drawings and seeds of Ceropegias, bequeathed to him by the late Mr. W. E. Ledger. A valuable collection of Madagascan plants was received from M. H. Perrier de la Bathie.

Research and Publications.—The greater part of Mr. J. Hutchinson's time has been spent on the preparation of the manuscript of the Monocotyledons for the Flora of West Tropical Africa and Mr. V. S. Summerhayes has also been largely engaged on the elaboration of Orchidaceae for the same work.

In addition to the Enumeration of Major Lugard's Mt. Elgon plants, which will be published in the Kew Bulletin, and the account of the Belgian Congo Compositae already mentioned (in the press), the following papers have been published :—

Entandrophragma cylindricum, by A. C. Hoyle (*K.B.* 1932, 40).

Tropical African Plants : IX (*K.B.* 1932, 94).

Chidlowia, a new tree genus of Caesalpiniaceae, by A. C. Hoyle (*K.B.* 1932, 101).

New Trees and Shrubs from Tropical Africa, by J. Burtt Davy & A. C. Hoyle (*K.B.* 1932, 257).

African Orchids: III and IV (*K.B.* 1932, 188, 388).

The genus Strobilanthopsis (*K.B.* 1932, 344).

Canthium in British East Africa (*K.B.* 1932, 353).

The Grassland Vegetation of the Cameroons Mountain, by T. D. Maitland (*K.B.* 1932, 417).

A new species of Arborescent Senecio from Ruwenzori (*K.B.* 1932, 438).

The Arborescent Senecios of Mount Elgon (*K.B.* 1932, 465).

New species from Mount Elgon (*K.B.* 1932, 487).

South Africa.—Many specimens from South Africa were as usual sent for purposes of identification or verification from various official sources. About 1000 were communicated by the National Herbarium, Pretoria, mainly from the collections of Messrs. H. G. Flanagan, E. E. Galpin, A. P. G. Goosens and C. G. Trapnell.

Mr. F. R. Long, of Port Elizabeth, Mr. N. S. Pillans, of the Bolus Herbarium, and Miss H. M. L. Forbes, of the Natal Herbarium, also forwarded many species ; others were received from the Transvaal Museum, Pretoria, and the Albany Museum, Grahamstown, the latter including many duplicates collected by Mr. R. A. Dyer.

The Hon. Mrs. A. D. Ryder presented a useful collection from the Cape Province, and over 600 miscellaneous plants, including many syntypes, were presented by Capt. T. M. Salter. A well prepared set of *Oxalis* spp., collected by Dr. C. L. Leipoldt, was received through the Bolus Herbarium. Miss W. Barker, who is attached to that Institution in the service of Kew, has forwarded a series of 562 excellently dried specimens, including many interesting species and a proportion of syntypes. Two collections made by General the Rt. Hon. J. C. Smuts, P.C., F.R.S., were communicated by the National Herbarium, one from the mountains in the Eastern Transvaal, the other from the little-known area east of the Zoutpansberg.

A regular flow of small parcels of mounted specimens, mainly of plants which could not be completely determined at the National Herbarium, has been maintained. Specimens of Transvaal Malvaceae and Sterculiaceae were received for determination from the Empire Cotton Growing Corporation, in connection with the investigation of host plants of Cotton pests. A small set of plants was purchased from Mr. E. G. Bryant, collected in the arid and little-known area of Prieska.

In connection with his work on a Flora of Albany and Bathurst Divisions, Mr. Dyer, the South African Assistant, has had on loan 1067 mounted specimens from the Albany Museum, Grahamstown, whilst that Institution and other South African herbaria communicated their collections of Cycadaceae for the Supplement to the Flora Capensis.

Research and Publications.—The Supplement to the Flora Capensis, containing an account of the Gymnosperms, is now in the press, and the investigation of the flora of Albany and Bathurst is in progress. The following papers have been published :—

Erythrophysa alata (*K.B.* 1932, 149).

Notes on African Grasses : XII (*K.B.* 1932, 151).

Notes on the Flora of Southern Africa : I–III (*K.B.* 1932, 152, 443, 510).

Inezia, a New Genus of Compositae from South Africa, by E. P. Phillips (*K.B.* 1932, 297).

New South African Iridaceae, by L. Bolus (*K.B.* 1932, 326).

America.

In this department the study of the Floras of British Guiana and adjacent regions of tropical America has been continued. The identification of the plants collected on the Oxford Expedition to British Guiana was completed and since then a fine set of plants

collected mainly by Mr. T. A. W. Davis, Assistant Conservator of Forests, has been received and studied. These came from the Kanaku Mountains and Upper Rupununi River in the interior of the colony, and include new species of large trees never before felled in this region. Other work on British Guiana includes a revision of the species of *Mora* and *Dimorphandra* and an account of the species of *Strychnos* occurring in the Colony; an investigation of the Bignoniaceae has also been taken in hand.

Several small collections from Tropical America have now been named and incorporated in the Herbarium, notably some interesting plants collected by Mr. W. Fox in the Department of Loreto, Amazonian Peru, received in 1911. The remainder of the Lehmann collection from Colombia and Ecuador has now been named or partially named, and prepared for distribution.

A few large genera were re-arranged and written up by recent monographs, including *Mimulus* by Dr. A. L. Grant's monograph, *Annona* by Prof. R. E. Fries' recent paper, *Anguria* and *Gurania*.

During the year 8660 specimens have been mounted and some 6800 sheets have been incorporated.

Some valuable sets of duplicates have been received in exchange, the most notable being the following: seventy-six specimens, mostly syntypes, of plants from the newly-explored Mount Duida in Venezuela, presented by the New York Botanical Garden; a large number of rare and interesting plants from Amazonian Brazil, Peru and Colombia, collected mainly by E. P. Killip and A. C. Smith, from the United States National Herbarium; specimens of new or rare Surinam species, from the Utrecht Herbarium; a set of plants from the Revillagigedo Archipelago, from the California Academy of Sciences; and a series of 330 Willows, critically determined by Dr. C. R. Ball, from the University of California. In addition, a fine collection of over 1400 excellently dried specimens from Mexico has been presented by Mr. G. B. Hinton, and a small set of very useful Patagonian specimens by Mrs. M. E. Blake.

The following collections were also received :—

North America.—*Presented*: Canada, by Dr. C. Christensen; United States, by Mr. I. H. Burkill; the Bureau of Plant Industry, United States Department of Agriculture, Washington (cultivated grass Sorghums); the California Academy of Sciences, San Francisco (coll. Miss A. Eastwood); the Carnegie Institution of Washington, Stanford University (coll. D. D. Keck); the New York Botanical Garden (coll. H. N. Moldenke); the University of California, Berkeley (coll. E. B. Copeland and V. Duran); and by the University of California, Los Angeles (coll. Carl Epling).

Central America.—*Presented*: Costa Rica, by Mr. C. H. Lankester.
Purchased: Mr. W. A. Schipp, British Honduras plants.

West Indies.—*Presented*: Cuba, by the Arnold Arboretum, Harvard University (coll. J. G. Jack); Trinidad and Tobago, by the Department of Agriculture (coll. R. O. Williams).

Purchased : Mr. W. E. Broadway, Trinidad plants ; Mr. E. J. Valeur, Dominican Republic plants.

East Tropical South America.—*Presented* : Brazil, by the Gray Herbarium, Harvard University (coll. H. N. Whitford).

West Tropical South America.—*Presented* : Galapagos and Cocos Islands, by the Brooklyn Botanic Garden (coll. H. K. Svenson).

Purchased : United States National Museum, Colombian and Peruvian plants (coll. G. Klug).

Temperate South America.—*Presented* : Argentine, by Dr. Angel L. Cabrera.

Purchased : Dr. A. Donat, Plantae Patagonicae, Century iii.

Research and Publications.—The following papers dealing with the botanical results of the Oxford University Expedition to British Guiana have been published :—

New and noteworthy Bignoniaceae from British Guiana (*K.B.* 1932, 81).

New Euphorbiaceae, by J. Lanjouw, Utrecht (*K.B.* 1932, 183), including the description of a new genus.

New and noteworthy species from British Guiana (continued) (*K.B.* 1932, 209).

Other papers are :—

The Tabebuias of British Guiana and Trinidad (*K.B.* 1932, 18).

New Species of Nototriche from Bolivia (*K.B.* 1932, 77).

Laugeria " Vahl " = Terebraria Kuntze (*K.B.* 1932, 349).

Mora and Dimorphandra in British Guiana (*K.B.* 1932, 395) ; and A New Berberis from Chile and Argentina (*K.B.* 1932, 454).

Australia (including New Guinea) and New Zealand.

During the year several genera of grasses have been revised and re-arranged. All the grasses presented to Kew from the Brisbane Herbarium (1800 sheets) and other botanical institutions and by private persons during Mr. C. E. Hubbard's visit to Australia have now been mounted and are being incorporated. Dr. K. Domin kindly lent over 400 sheets of his Queensland specimens, including many types, which have been of great value in the identification of the large collections of Australian grasses which have reached Kew during the last few years. In connection with this work, the types of all of Lindley's species of Australian grasses in the Cambridge University Herbarium have also been borrowed.

Large mixed collections have been received from Mr. C. T. White, of the Botanic Museum and Herbarium, Brisbane, Mr. A. Morris, Broken Hill, New South Wales, and from the National Herbarium of Victoria. These mostly consist of named plants and duplicates of type or authentic material. Dr. F. A. Rodway has continued to send valuable collections amounting to 450 numbers, largely named, mostly from New South Wales. Further instalments of Tasmanian plants have been purchased from the Tasmanian Museum and Art Gallery, Hobart.

A collection of Central Australian grasses was presented by Professor J. B. Cleland, and a set of grasses collected by Mr. L. J. Brass in various parts of North Queensland was received from Mr. C. T. White. These were from the areas which had hitherto been visited by only one or two collectors who had paid little attention to the grasses.

In addition the following collections were presented :—

AUSTRALIA :—New South Wales, by the Rev. E. N. McKie ; Queensland, by the Arnold Arboretum, Harvard University (coll. C. T. White and S. F. Kajewski), Mr. L. J. Brass, and by Mr. G. K. Jackson (ferns and grasses) ; South Australia, by Mr. J. M. Black ; Victoria, by Miss J. Galbraith ; various, by Dr. A. Meebold.

NEW GUINEA :—By the Department of Agriculture (coll. J. L. Froggatt).

NEW ZEALAND :—By Dr. W. A. Sledge and by Miss N. E. Watt.

Research and Publications.—The Occurrence of the genus Aceratium (Elaeocarpaceae) in Australia, by C. T. White (*K.B.* 1932, 42).

A paper on the genus *Dentella* in Australia, for which copious material has been presented or loaned by most of the botanical institutions of that continent, has been prepared.

The Gaultherias and Pernettyas collected by the Director and others in New Zealand, Tasmania and Australia have been studied in connection with their S. American allies by the Director and Mr. B. L. Burtt, his botanical Assistant, and the account will shortly be published.

OCEANIA.

Several small collections have been named from Fiji and advantage was taken of the late Dr. J. W. Gillespie's visit to name practically the whole of the collection made by Mrs. J. D. Tothill and also plants collected by Mrs. C. J. Parham. Work was continued on specimens collected by Mr. S. F. Kajewski in the Santa Cruz Islands forwarded from the Arnold Arboretum. Mr. J. H. L. Waterhouse sent some further instalments from Bougainville Island, while collections of *Ficus* have been received for identification from Professor E. B. Copeland, University of California, and from the Bernice B. Bishop Museum, Honolulu. A large collection of duplicates collected by Mr. Kajewski in the New Hebrides was presented by the Arnold Arboretum.

The following collections were also presented :—Bougainville, by the School of Forestry, Yale University (coll. J. H. L. Waterhouse) ; Samoa, by the University of California, (coll. W. A. Setchell) ; Fiji, by the Department of Agriculture (grasses, coll. C. A. Turbet).

Research and Publications.—The collection of New Hebridean Figs presented by the Arnold Arboretum has been named and a paper published in the Journal of the Arnold Arboretum.

Work was continued on the species of *Ficus* from Tonga, Fiji, Samoa and Solomon Islands.

Pteridophyta.

Amongst additions to the fern and fern-ally collections during the year was a set of 172 specimens collected in Ceylon about the year 1866 and presented to Kew by Mrs. A. McDonell. This collection had been partially named by G. H. K. Thwaites, when Conservator of the Botanic Garden, Peradeniya. Prof. R. R. Stewart presented a set of ferns he collected in the N.W. Himalayas and Kashmir and Dr. G. Morgan presented a collection from Darjeeling. An interesting series from the New Hebrides was forwarded by Mr. R. A. Sykes, formerly Conservator of Forests, and a collection from Queensland made by Mr. G. K. Jackson. A duplicate set of ferns, collected in China by J. F. Rock, was presented by the United States National Museum. Over 1700 sheets were incorporated during the year.

The whole of the Kew material of *Leptochilus* was sent on loan to Mr. R. C. Ching at Copenhagen to assist him in his revision of that genus and was returned duly written up before his departure for China.

A critical investigation of the ferns of West Tropical Africa was commenced for their incorporation in the Flora.

Research and Publications.—Two new Ferns from Colombia, by W. R. Maxon (*K.B.* 1932, 134).

Pteridophyta collected by the Oxford Expedition to British Guiana, 1929, by A. H. G. Alston (*K.B.* 1932, 305).

Bryophyta.

Amongst collections of Mosses received during 1932 the more important were those presented by Professor R. R. Stewart from Kashmir, Mr. R. E. Vaughan from Mauritius, Mr. K. W. Allison from New Zealand, Miss M. Steele from the Cameroons Mountain, and by the United States National Museum, from Jamaica (coll. E. P. Killip and W. R. Maxon). A number of Hepaticae from New Zealand, Mauritius, Ruwenzori, Kashmir, and various parts of Europe has been identified. Before this could be done a rearrangement of the material in various genera was found to be necessary. The formation of a working collection of microscopic preparations of authentic material of Hepaticae has also been started in order to facilitate the naming of collections. Series iii and iv, *Hepaticae Selectae et Criticae* were purchased from Mr. Fr. Verdoorn.

Unofficially, as Excursion Secretary of the British Bryological Society, Mr. C. V. B. Marquand accompanied a small party in a bryological exploration of a previously unworked mountain range in Arctic Norway. A valuable series of specimens has been presented to Kew and a paper on the results of the expedition will be published shortly.

Thallophyta.

Algae.—In addition to the determinations of British plants, collections of Algae have been named from Australia, Canada, the

West Indies, the Gold Coast and Mauritius. Assistance afforded to research workers in the British Isles included principally critical determinations for local surveys. Type specimens have also been selected for despatch on loan to other institutes, particularly material of *Codium* to Prof. W. A. Setchell.

At the request of Prof. T. A. Stephenson, of Cape Town University, several extensive collections of Algae have been named in connection with a general ecological survey of the flora and fauna of Still Bay, about 200 miles east of Cape Town. Dr. F. P. Metcalf, of the Lingnan University, Canton, presented a collection of Chinese Algae, and Dr. F. Boergesen contributed specimens of his new species of Indian Rhodophyceae. A small set of South African specimens was purchased from Miss M. Purcell.

Research and Publications.—A new species of *Codium*, of the *adhaerens* section, from the Cape Peninsula, was described in the Revue Algologique, and the MS. of a paper on Some Algal Balls from Tasmania was sent to the press.

Some Indian Rhodophyceae : II, by F. Boergesen (*K.B.* 1932, 113).

Fungi.—The routine work involved a large number of replies to miscellaneous identification inquiries, both British and foreign, advice on diseases of horticultural plants and the extraction and collation of information relating to fungi of industrial importance. The assistance given to research workers in the determination of critical species has also involved much time. Amongst collections of fungi received for determination, mention may be made of the following material :—from India (Professor S. R. Bose, and Messrs. S. Banerjee, C. E. Parkinson and J. C. Sengupta) ; Singapore (Mr. E. J. H. Corner) ; Southern Rhodesia (Messrs. J. C. F. Hopkins and F. Eyles) ; Kenya (Mr. C. A. Thorold) ; and Southern and Tropical Africa (Mr. O. A. Høeg). A set of fungi from the Amazons River Drainage collected by J. R. Weir and specimens collected in the United States by O. F. Cook were presented by the Bureau of Plant Industry, United States Department of Agriculture, Washington. Numerous rare and critical species of British fungi have also been added to the collections. Fascicles 50-52, *Mycotheca germanica*, were purchased from Herr. H. Sydow, and Century iii, *Mycoflora Domingensis Exsiccata* from Dr. R. Ciferri.

Assistance was given to Dr. R. M. Nattrass in the preparation of a list of the fungi occurring in Cyprus, an area which is practically unknown from a mycological standpoint.

Mr. C. G. Hansford has worked for some months on his collections of Uganda fungi and conjointly with him a paper on the Uredineae of Uganda has been prepared for publication. It is hoped to deal in a similar way with other groups of fungi from this region.

Dr. C. J. Humphrey, Mycologist to the Department of Agriculture, Philippine Islands, spent several weeks studying the Polyporaceae in the Kew collections with a view to the publication of a series

of monographic studies on this group. During Dr. Humphrey's stay he kindly allowed a selection of material to be taken from his own collection. The specimens thus extracted have greatly enriched the Kew collections.

In connection with the opening of the new wing the congestion in the Cryptogamic department was relieved by expanding the collection, and numerous specimens, temporarily housed in boxes, were incorporated in their proper position. The British collection has been placed in a special block of cabinets, and it is hoped to build up a useful working collection of British fungi.

Research and Publications.—Preliminary List of Fungi or Diseases of Economic Plants in Tanganyika Territory, by G. B. Wallace (*K.B.* 1932, 28).

Biological and Genetical Herbaria.

About 1500 specimens have been added to these collections during the year. These include: (1) additional material from the ecological survey which is being undertaken in Richmond Park, (2) further specimens illustrating breeding and field work in *Anthyllis*, *Silene*, *Centaurea*, and *Saxifraga*, (3) numerous specimens of various genera to illustrate points in their life history or ecological peculiarities. Prof. Baur presented seed of some of his more striking *Antirrhinum* mutants and a good series of specimens has been made from plants raised from this seed at Kew.

Summary.

The routine work, apart from naming, accomplished by the regular staff and by the special store staff during 1932 is summarised as follows:—

Mounted	59,000 (approx.)
Incorporated	27,000 (approx.)
Duplicates distributed	13,092
Specimens received on loan	8,772
Specimens sent out on loan	6,046
Specimens presented or purchased ...	50,018

Illustrations and Portraits.

The routine work of preparing drawings, taking photographs and making lantern slides for various purposes has been exceptionally heavy. In addition a number of coloured drawings of various plants has been prepared for the Kew collection of drawings and also a series of studies of *Anthyllis* in connection with the experimental work at Potterne. About 300 sheets of type or authentic specimens borrowed from other herbaria have been photographed for the Kew collection and about 600 sheets of Kew specimens have been photographed for other Institutions.

The third part of vol. ii of the Fifth Series of Hooker's Icones Plantarum appeared in June (see *K.B.* 1932, 411). The fourth part is now ready for the press, and the preparation of the first part of the

next volume has been begun. The Bentham-Moxon Trustees intend to publish two parts each year in future. The average output for the twenty years 1897–1916 was one part annually, but publication was suspended during the latter part of the War, and only four parts have appeared since, namely, in 1922, 1927, 1930 and 1932. The new arrangements are due to the appointment of a botanical artist by the Trustees.

The most important acquisition during the year was the presentation by the Bentham-Moxon Trustees of a valuable collection of 648 coloured drawings, including a number on vellum signed by G. D. Ehret and Margaret Meen (see *K.B.* 1933, 2). Another valuable collection was that presented by Miss W. M. E. Fowler, Odiham, Hants. This consists of 300 water-colour sketches of flowers made by her about 30 years ago in the Orange Belt of Florida. They are on paper about $7\frac{3}{4}$ in. by 6 in., are named, and are accompanied by MS. notes.

The miscellaneous drawings and photographs of plants which have been received, and which will be incorporated in the general collection, include 89 original drawings prepared for the Botanical Magazine, and 19 photographs, presented by the Royal Horticultural Society through Dr. Stapf; 40 plates of the Flowering Plants of South Africa from Dr. I. B. Pole Evans; 20 photographs of Bromeliaceae, from the Gray Herbarium, and about 100 photographs of specimens of *Ganoderma* Karst. (*Fomes* Fries), from Dr. C. J. Humphrey of the Bureau of Science, Manila. Other photographs have been received from the Natal Herbarium, the New York Botanical Garden, Mr. I. H. Burkill and Dr. J. Burtt Davy.

Additions to the collection of portraits of botanists include photographs of Mr. Leonard Rodway, from Dr. F. A. Rodway, of Dr. Harold Lindberg, and of Sir J. D. Hooker and Dr. Alexander Prior, both by Messrs. Maull, from Miss E. M. Harting. Miss Harting has also presented a replica, in pewter, of the Gold Medal which was awarded Sir J. D. Hooker by the Linnean Society in 1898.

Nomenclature and Bibliography.

Throughout the year numerous enquiries have been received and answered, many requiring detailed nomenclatural investigation, and others entailing the searching of literature for obscure names.

Pending the publication by the Editorial Committee of the third edition of the International Rules of Nomenclature, a rough draft embodying the decisions of the Cambridge Congress was prepared for immediate practical use. This has been found invaluable.

In the early part of the year a study was made of Patrick Browne's Civil and Natural History of Jamaica (1789), in order to ascertain whether his generic names were valid. It was found that the new names of monotypic genera published by him were validated by the accompanying descriptions, and that those genera including more than one species were validly published wherever the type

species was indicated, in spite of the fact that the validating description included characters peculiar to that species in addition to generic ones.

A revision of the plant names proposed for the new edition of the British Pharmacopoeia was undertaken, and in connection with this work an article on " the Botanical Names of Lavender and Spike " was prepared, clearing up the confusion in the nomenclature of these two commercial products (*K.B.* 1932, 295).

It was discovered that the genus of Rubiaceae commonly known as " *Laugeria* Vahl " should bear the name *Terebraria* Kuntze. An account of the synonymy and geographical distribution of the genus and its two species was published in *K.B.* 1932, 349.

An investigation was made into the type of the generic name *Allantoma* Miers (Lecythidaceae), and useful general criteria were obtained for the proposed " Regulations for determining types," which will be discussed at the next International Botanical Congress at Amsterdam, in 1935 (Journ. Bot. 1932, 231).

Index Kewensis.

The compilation of Supplement VIII was brought to a close, and the entire card index has now been duplicated for permanent reference. The preparation of the work for the Press was also completed, and a first instalment of one half was sent to the Clarendon Press in October.

Experimental and Transplant Work.

Work was continued at Potterne and Kew on *Silene* and *Centaurea* and additional ground has had to be acquired in order to accommodate plants of the latter genus. The results of further cytological research on *Saxifraga* have made a series of additional crosses necessary. At present the breeding and cytological results are not fully harmonized, but both are giving results of much interest and importance. The field and breeding studies in *Anthyllis* have been completed and two papers on this genus prepared for publication. Work on the British variations of *Anagallis* is proceeding.

The transplant experiments are being continued and *Fragaria vesca* and *Phleum pratense* (diploid and hexaploid), have been added to the species in the beds.

Publications.—Researches on Silene maritima and S. vulgaris: VIII–X (*K.B.* 1932, 229, 271, 390).

Visitors.

The number of signatures in the Visitors' book for 1932 was 5440. The following were amongst the most noteworthy or frequent visitors to the Herbarium :—

Major G. Aylmer, Department of Agriculture and Forests, Khartoum, Sudan.

Mr. E. G. Baker; Dr. J. Barthelet, Antibes, France; Mr. W. J. Bean; Mr. L. A. Boodle; Prof. C. E. B. Bremekamp, Utrecht; Dr. N. E. Brown; Mr. I. H. Burkill; Prof. A. H. R. Buller, University of Manitoba; Dr. E. J. Butler, Imperial Mycological Institute.

Mr. W. S. Chamberlain.

Dr. J. M. Dalziel; Dr. J. Burtt Davy, Imperial Forestry Institute, Oxford; Mr. H. N. Dixon.

Mr. A. W. Exell, Natural History Museum; Mr. P. J. Eyma, Utrecht.

Prof. H. M. Fitzpatrick, Cornell University; Mr. H. R. Fletcher, The University, Aberdeen; Dr. B. Floderus, Stockholm; Dr. H. G. Fourcade, S. Africa; Mr. J. Fraser.

Dr. M. Gard, Bordeaux; Dr. J. W. Gillespie, Arizona University; Mr. H. B. Gilliland, University of Edinburgh; Dr. P. L. Giuseppi; Mr. W. B. Grove.

Mr. C. G. Hansford, Dept. Agric., Uganda; Mr. M. R. Henderson, Botanic Garden, Singapore; Mr. A. C. Hoyle, Oxford; Dr. C. J. Humphrey, Bureau of Science, Manila.

Dr. Ivan Johnston, Arnold Arboretum.

Dr. A. F. G. Kerr; Mr. E. P. Killip, U.S. National Museum, Washington.

Mr. C. H. Lankester; Mr. E. Lawrence, Dept. Agric., Nyasaland; Dr. Harald Lindberg, Helsingfors University.

Mr. E. W. Mason, Imperial Mycological Institute; Mr. A. P. G. Michelmore, Gezira Research Farm, Sudan; Mrs. M. Moss, University of the Witwatersrand, Johannesburg.

Dr. J. H. Nannfeldt, Uppsala; Mr. N. T. Norlindh, Lund.

Mr. R. Paulson; Mr. T. Petch; Dr. O. Posthumus, Pasoeroean, Java; Mr. J. Pitt Schenkel; Mr. W. R. Price.

Dr. A. Rehder, Arnold Arboretum; Mr. H. N. Ridley; Mr. N. V. Rounce, Dept. Agric., Tanganyika Territory.

Mrs. C. Sandwith; Mr. A. C. Smith, New York Botanical Garden; Prof. N. J. G. Smith, Rhodes University College, Grahamstown; Mr. J. D. Snowden; Dr. O. Stapf; Prof. R. R. Stewart, Gordon College, Rawalpindi; Mr. C. F. Symington, Forest Research Institute, Kepong, Federated Malay States.

Capt. F. Kingdon Ward; Mr. H. Weimarck, Lund; Miss M. M. Whiting; Lt.-Col. A. H. Wolley-Dod; Mr. W. C. Worsdell; Mr. J. W. Wyatt.

Distribution of Duplicates.

The following were the principal institutions to which duplicates were distributed :—

Great Britain and Irish Free State.—Aberdeen, Cruickshank Botanic Garden; Dublin, Trinity College; Edinburgh, Royal Botanic Garden; London, Natural History Museum; Oxford, Imperial Forestry Institute.

Europe and Orient.—Berlin, Botanic Gardens and Museum; Brno, Masaryk University; Brussels, Botanic Gardens; Copenhagen, University Botanic Museum; Jerusalem, The Hebrew University; Leiden, 's Rijks Herbarium; Leningrad, Botanic Garden; Lund, Botanical Museum; Paris, Natural History Museum; Sarajevo, State Museum; Sofia, University, Department of Botany; Stockholm, Botanical Museum; Tervueren, Belgian Congo Museum; Utrecht, University Botanic Museum and Herbarium; Vienna, Natural History Museum; Zürich, Botanic Garden and Museums.

Africa.—Amani, East African Agricultural Research Station; Grahamstown, Albany Museum; Nairobi, Coryndon Memorial Museum; Pretoria, Division of Plant Industry.

Australia.—Brisbane, Botanic Museum and Herbarium.

America.—Chicago, Field Museum; Georgetown, Demerara, Forestry Department; Missoula, University of Montana, Department of Botany; Montreal University, Department of Botany; New York, Botanic Garden; Philadelphia, Academy of Natural Sciences; Rio de Janeiro, Botanic Garden; Washington, U.S. National Museum.

The Library.

The more important presentations received during the year are as follows:—

The Bentham Trustees have presented a number of volumes which include: L. Choulant, *Handbuch der Bücherkunde für die ältere Medicin*, zweite Auflage, 1841, Neudruck, 1926; *The tabular distribution of British plants*, 1787, attributed to the Earl of Bute; and a copy of the rare *Selectarum Stirpium Americanarum Historia*, by N. J. Jacquin (Vienna, about 1780). The last named is bound in three volumes and was formerly in the library of the Earl of Tankerville at Chillingham Castle, Northumberland. An account of a large and valuable collection of original coloured drawings of plants from the same library, which has been presented by the Bentham Trustees, is published in *K.B.* 1933, 2. As in previous years volumes or parts in continuation of several periodicals received in exchange for *Hooker's Icones Plantarum*, have been presented by the Bentham Trustees.

From the Royal Horticultural Society have been received three copies of the *Report of the Conifer Conference*, 1931 (*Conifers in cultivation*), three copies of *An account of the Sempervivum group*, by R. Lloyd Praeger, and one copy of the *Lily Year Book*, 1932. A second copy of the last named has been received from Major F. C. Stern.

Lieut.-Col. Sir David Prain has presented the continuation of several periodicals, as recorded in previous years, and a number of pamphlets.

From the Technological Museum, Sydney, the following have been received: *Cabinet timbers of Australia*, 1913, by R. T. Baker; *A*

research on the Eucalypts, especially in regard to their essential oils, by R. T. Baker and H. G. Smith, second edition, 1920 ; and *Woodfibres of some Australian timbers*, 1924, by the same authors.

The publications received from the Imperial Council of Agricultural Research, India, include the *Indian Journal of Agricultural Science* and *Scientific Monographs*, no. 1, *The fungi of India*, by E. J. Butler and G. R. Bisby, 1931, and no. 3, *The open pan system of white sugar manufacture*, by R. C. Srivastava, 1931.

The *Icones of the essential forest trees of Hokkaido*, by Professors K. Miyabe and Y. Kudo, the plates by C. Suzaki, a work in three folio volumes containing 86 coloured plates, with text in English and Japanese, was completed by the issue of the 28th fascicle in 1931. This first appeared in 1920, but the set at Kew, which had been presented by the Hokkaido Government, was deficient in fascicle 10, the stock of this and the previous 9 fascicles having been destroyed by fire at the time of the great earthquake in Tokyo in 1923. These fascicles have now been reprinted, and a copy of the tenth, with a second edition of the title-page, prefatory matter and index to the first volume, has been sent to Kew. Mr. Suzaki's coloured plates are admirable.

Among the publications received from the New York Botanical Garden are four further parts of the *North American Flora*, the continuation of *Addisonia*, the *Flora of the prairies and plains of Central North America*, by P. A. Rydberg, *Brittonia*, vol. i. no. 3, and a typed copy of C. S. Rafinesque's *Autikon botanicon : icones plantarum . . . centur. xxv.* Philadelphia, 1840–50, text only. Professor Merrill informs us that no illustrations for this work were ever prepared, Rafinesque's intention having been that the " figures " should take the form of dried specimens to be distributed by him.

The establishment is indebted to the kind offices of Dr. W. T. Swingle of the Bureau of Plant Industry, U.S. Department of Agriculture, for a bound photostat copy of the issues of the *Notes and Queries on China and Japan* from 1867 to 1869, containing the botanical writings of Theophilus Sampson relating to China. A copy of the account of Sampson's life and work given by Bretschneider in his *History of European botanical discoveries in China*, an index to the species of plants mentioned in Sampson's collected writings, and a Chinese-character index are also included in the volume. The work was prepared in the Office of the Chairman, Library Committee, U.S. Department of Agriculture, and was first issued in 1921. A second edition is dated January 20, 1932, and it is a copy of this that has been presented to the library. In a preface to the volume Dr. Swingle states that Sampson's herbarium of some 1800 plants was destroyed by fire in Canton in 1883. He points out that Sampson's writings are full of valuable information about South Chinese plants and that the journal in which they were originally published is now difficult to obtain.

Prof. V. L. Komarov of the Botanic Garden, Leningrad, has presented a copy of a work in Russian of which the English title is *Key for the plants of the Far Eastern Region of the U.S.S.R.*, written by himself and E. N. Klobukova-Alisova, and published by the Academy of Sciences, Leningrad, in two volumes, the first in 1931 and the second in 1932. It contains altogether 1175 pages, including 330 very good full-page figures, and deals with the flowering plants and vascular cryptogams of the region.

The following books were received from their publishers for review in the *Kew Bulletin*. From Messrs. Baillière, Tindall & Cox :—Forrest Shreve, *The Cactus and its home*, 1931 ; S. A. Waksman, *Principles of soil microbiology*, ed. 2, 1931. From Messrs. Ernest Benn :—T. Hedley Barry, *Natural varnish stains*, 1932. From the Crown Agents for the Colonies :—D. Bannerman, *The birds of Tropical West Africa*, vol. ii. 1931. From Messrs. Macmillan :—C. D. Darlington, *Chromosomes and plant-breeding*, 1932 ; E. P. Felt & W. H. Rankin, *Insects and diseases of ornamental trees and shrubs*, 1932 ; C. J. J. van Hall, *Cacao*, ed. 2, 1932. From Messrs. L. Reeve :—N. E. Brown, A. Tischer & M. C. Karsten, *Mesembryanthema, descriptions, with chapters on cultivation and general ecology*, edited by E. J. Labarre, 1931 (in English, German and Dutch).

The more important independent works and reprints from periodicals received, in addition to those already mentioned, are the following, which have been presented by their authors unless otherwise stated :—S. Akiyama, *Conspectus Caricum Japonicarum*, in *Journ. Fac. Sci. Hokkaido Imp. Univ.*, ser. 5, vol. ii. no. 1 ; A. Andersson, *Studien über die Embryologie der Familien Celastraceae, Oleaceae und Apocynaceae*, in *Lunds Univ. Årsskr.* N. F., Avd. 2, Bd. 27, nr. 7 ; L. H. Bailey, *Gentes herbarum*, vol. ii. fasc. 6 ; Mrs. H. M. L. Bolus, *Notes on Mesembrianthemum and allied genera*, pt. 2, pp. 309–376 (3 copies) ; *The British Pharmacopoeia*, 1932, published and presented by the General Medical Council ; *Catalogue des plantes de Madagascar*, publié par l'Académie Malgache, 1931–32 : *Chlaenaceae, Dioscoreaceae, Scrophulariaceae*, by H. Perrier de la Bathie, *Pteridophyta*, by C. Christensen (from the Académie Malgache and the authors) ; *Centenaire de la Société Royale des Arts et des Sciences de l'Ile Maurice*, 1829–1929 (from the Society) ; L. Chalk & J. Burtt Davy (Editors), *Forest trees and timbers of the British Empire*, I : *Some East African Conifers and Leguminosae* (2 copies, from the Oxford University Press and the Imperial Forestry Institute, Oxford) ; C. Christensen, *The Pteridophyta of Madagascar*, in *Dansk Bot. Arkiv*, vol. vii. ; G. H. Clark & M. O. Malte, *Fodder and pasture plants* [of Canada], 1913 (from Dr. O. Stapf) ; Sir Jeremiah Coleman, Bt., *Hybridization of Orchids : the experiences of an amateur* ; *Collected Papers from the Department of Pharmacology, Peiping Union Medical College*, vol. iii. (from Prof. B. E. Read) ; W. G. Craib, *Florae siamensis enumeratio*, vol. ii. pt. 1 (from The Siam Society, Bangkok) ; G. H. Cunningham, *The rust fungi of New Zealand*, &c., 1931 ; J. Burtt Davy, *A manual*

of the flowering plants and ferns of the Transvaal with Swaziland, pt. 2 ; O. Degener, *Flora hawaiiensis*, 151 ff. ; G. Delevoy, *Études systématiques des bois du Katanga*, fasc. 4–7, 1930–32 (from Comité Spécial du Katanga) ; É. De Wildeman, *Plantae Bequaertianae*, vol. v. fasc. 4 ; D. S. Dramba, *Étude physique et mécanique du bois roumain* (from Casa Autonoma a Pădurilor Statului, Bucharest) ; A. Eaton, *Manual of botany*, ed. 5, 1829 (from the Gray Herbarium) ; P. J. Eyma, *The Polygonaceae, Guttiferae and Lecythidaceae of Surinam* ; M. L. Fernald, *The linear-leaved North American species of Potamogeton, section Axillares*, in *Mem. Amer. Acad.* vol. xvii. pt. 1, forming *Mem. Gray Herb.* III. ; *Flora Sībīrī ī Dal'negho Vostoka* (*Flora Sibiriae et Orientis extremi a Museo Botanico Academiae Scientiarum edita*), pts. 2–4, 1915–26 (from the Academy of Sciences, Leningrad) ; R. E. Fries, *Revision der Arten einiger Anonaceen-Gattungen*, II, 1931, in *Acta Horti Bergiani*, Bd. 10, no. 2 ; Mme. L. Gauthier-Lièvre, *Recherches sur la flore des eaux continentales de l'Afrique du Nord*, 1931, as *Mém. hors-série, Soc. d'Hist. Nat. de l'Afrique du Nord* ; A. W. Goldsmith & A. L. Hafenrichter, *Anthokinetics* : the *physiology and ecology of floral movements* (from the Carnegie Institution of Washington) ; Christine J. Gorter, *Groeistofproblemen bij wortels* ; J. Th. Henrard, *A monograph of the genus Aristida*, vol. ii. in *Mededeel. 's Rijks Herb. Leiden*, no. 58A ; L. J. Laporte, *Recherches sur la biologie et la systématique des Desmidiées*, 1931 (from the Editor of *Nature*) ; A. Lemée, *Dictionnaire descriptif et synonymique des genres de plantes phanérogames*, tome 4 ; H. Lindberg, (1) *Die nordischen Alchemilla vulgaris-Formen und ihre Verbreitung*, 1909, in *Acta Soc. Sci. Fenn.* vol. xxxvii. no. 10, and (2) *Itinera mediterranea* : *ein Beitrag zur Kenntnis der westmediterranen Flora*, in *Acta Soc. Sci. Fenn.* N.S., vol. i. no. 2 ; E. J. Lindeijer, *De Bacterieziekte van den wilg veroorzaakt door Pseudomonas saliciperda n. sp.* (from Director, Phytopathologisch Laboratorium "Willie Commelin Scholten," Baarn, Holland) ; J. C. Loudon, *An encyclopaedia of plants*, 1829 (from the Rev. F. A. Rogers) ; M. Louvel, *Atlas des plantes ornamentales et curieuses de Madagascar*, publié a l'occasion de l'Exposition Coloniale Internationale de Paris, 1931 (from Librarian, Department of Overseas Trade) ; T. Lundblad, *Beiträge zur pflanzlichen Elektrophysiologie*, 1927 ; S. Mangham & W. Rae Sheriffs, *A second biology*, 1931 (from Prof. S. Mangham) ; T. Martyn, *Flora rustica* [1792–94], issued in one volume, with uncoloured plates (from the Rev. F. A. Rogers) ; B. Miyazawa, *Results in breeding Paeonia albiflora and its botanical and horticultural history*, in *Bull. Kanagawa-Ken Agric. Exper. Stat.* no. 52 ; T. Nakai, *Flora sylvatica koreana*, pars xix. (from the Forest Experiment Station, Government General of Chosen) ; J. A. Nannfeldt, *Studien über die Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten*, in *Nova Acta Reg. Soc. Sci. Upsal.* ser. 4, vol. viii. no. 2 ; E. Nelmes & W. Cuthbertson, *Curtis's Botanical Magazine dedications, 1827–1927* ; *portraits and biographical notes*, 1931 (from Mr. W. Cuthbertson) ; *Nova Guinea* : *résultats des expéditions*

scientifiques à la Nouvelle Guinée, vol. xiv. Botanique, livr. 4 (from Maatschappij ter Bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën) ; G. B. Patvardhan & G. B. Deshmukh, *A hand book of horticultural practices*, 1931 (from Mr. I. H. Burkill) ; Helena F. M. Petter, *Over roode en andere Bacteriën van gezouten visch* ; A. Pulle (Editor), *Flora of Surinam*, 4 parts (from Kon. Ver. Koloniaal Instituut, Amsterdam) ; L. Kolderup Rosenvinge & E. Warming (Editors), *The botany of Iceland*, vol. ii. pt. 3 (9), *Fungi of Iceland*, by P. Larsen ; H. St. John & E. Y. Hosaka, *Weeds of the Pineapple fields of the Hawaiian Islands*, in *Univ. Hawaii Research Publ.* no. 6 (from Prof. H. St. John) ; A. C. Smith, *The American species of Thibaudieae*, in *Contr. U. S. Nat. Herb.* vol. xxviii. pt. 2 ; *Simon van der Stel's Journal of his expedition to Namaqualand, 1685–6* ; edited from the manuscript in the Library of Trinity College, Dublin, by G. Waterhouse (from Sir A. W. Hill) ; C. Tadulingam & G. Venkatanarayana, *A handbook of some South Indian weeds*, 1931 (from Director of Agriculture, Madras) ; R. O. Williams, *Flora of Trinidad and Tobago*, vol. i. pt. 5, 2 copies (from Department of Agriculture, Trinidad and Tobago). Those of which the year of publication is not stated were issued in 1932.

The periodical and serial publications now received as purchases, exchanges or presentations are so numerous that even all of the last named cannot be mentioned in the restricted space of this note. In addition to the continuation of most of those recorded in previous Reviews and of the few already referred to in this note, the following have been presented, as a rule by the editors, societies or institutions issuing them :—*Acta Phytotaxonomica et Geobotanica*, published by the Phytogeographical Society, Kyoto, Japan, vol. i. nos. 1–3 ; *Agricultural Journal*, Department of Science and Agriculture, Barbados, vol. i. nos. 1–2 (2 copies) ; *The American Orchid Society Bulletin*, vol. i. nos. 1–2 ; *Annales Botanici Societatis Zoologicae-Botanicae Fennicae Vanamo*, vol. i ; *Annales de l'École Nationale des Eaux et Forêts* (Nancy), vol. i–iv. fasc. 1 (1923–31) ; *Annual Report of the Indian Museum, Industrial Section*, 1901–02–1910–11 (from Mr. I. H. Burkill) ; *The British Bryological Society, Reports*, 1927–31 ; *The Cactus Journal* : official organ of the Cactus and Succulent Society of Great Britain, vol. i. nos. 1–2 ; *Ecology*, vol. xiii. (from Director, Imperial Mycological Institute, Kew) ; *Lavori dell' Istituto Botanico della R. Università di Cagliari*, 1–7, 1930–31 (reprints of papers by Prof. R. Pampanini) ; *Leaflets of Western Botany*, vol. i. nos. 1–4 (from Miss Alice Eastwood) ; *Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University*, vol. iv. *A monograph of the Satsuma orange*, by T. Tanaka ; this has also been issued as *Contributions from the Horticultural Institute, Taihoku Imperial University*, no. 8, a copy of which has been presented by the author ; *Northern Rhodesia, First Annual Bulletin of the Department of Agriculture* ; *Proceedings of the Dorset Natural History and Antiquarian Field Club*, vol. xxix. & xxx. 1908 & 1909 (from Mr. H.

J. Goddard) ; *Rapport sur le fonctionnement de l'Institut des Recherches Agronomiques* (Paris) *pendant l'année 1931* ; *Report of the Department of Agriculture and Forests, Palestine, for the years 1927 to 1930* ; and *Symbolae Botanicae Upsalienses*, i : *Cytological studies in Primula*, by H. G. Bruun (from the Botaniska Institutionen, Upsala).

Periodicals or other publications issued by them have been received as in previous years from the Empire Marketing Board, the Empire Cotton Growing Corporation, the Imperial Agricultural Bureaux at Cambridge and Aberystwyth (Plant-Genetics), at Harpenden (Soil Science), at East Malling (Fruit Production), and at St. Albans (Agricultural Parasitology), the Botanical Laboratory of the University of Utrecht, the Botanical Museum of the University of Zurich, the Departments of Agriculture and Forestry in India and in many of the colonies, protectorates and other parts of the British Empire, the Indian Lac Association for Research, the Department of Agriculture, Industry and Commerce in the Dutch East Indies, the Bureaux of Science, Plant Industry and Forestry, Philippine Islands, the Smithsonian Institution, Washington, the United States Department of Agriculture, the Missouri Botanical Garden, St. Louis, the Cornell University Agricultural Experiment Station, Ithaca, the Arnold Arboretum and the Gray Herbarium of Harvard University, and the University of California. Many publications have been received from institutions in the U.S.S.R. in addition to those from the Academy of Sciences, Leningrad. The Institute of Applied Botany and New Cultures, Leningrad, and the Scientific Research Institute of Cotton Culture and Industry, Nihi, Tashkent, have contributed very liberally, and several issues of *Soviet Subtropics*, in Russian, published at Sukhoum, Abkhasia, have been received.

Reprints, usually from periodicals, additional to those already mentioned in the paragraph relating chiefly to independent works, have been received from numerous authors, among whom are : Mr. John Adams, Mr. S. Akiyama, Prof. Oakes Ames, Mrs. H. M. L. Bolus, Dr. F. Börgesen, Miss A. Camus, Dr. E. B. Copeland, Dr. B. H. Danser, Dr. É. De Wildeman, Prof. K. Dinter, Mr. H. N. Dixon, Dr. G. Einar Du Rietz, Mr. H. Dusi, Prof. R. R. Gates, Dr. H. A. Gleason, Dr. Marshall Howe, Mr. H. S. Jackson, Dr. F. Morton Jones, Miss M. C. Karsten, Dr. R. Lemesle, Dr. W. R. Maxon, Mr. T. Petch, Prof. K. von Poellnitz, Mr. J. Ramsbottom, Prof. W. Robyns, Prof. Harold St. John, Prof. C. Skottsberg, Dr. J. J. Smith, Dr. C. G. G. van Steenis, Dr. W. T. Swingle, Mr. I. Thériot, Prof. F. Tobler, and the late Prof. J. Valckenier Suringar.

A provisional map showing the types of vegetation in Southern Rhodesia, prepared by the Division of Forestry in 1930, has been received from the Chief Forest Officer, Salisbury, and a tourist map of the north coast of New South Wales, 1916, from the Agent-General for New South Wales.

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Printed under the authority of His Majesty's Stationery Office.
By The South Essex Recorders, Ltd., High Road, Ilford.

(4) Wt. 71/28 925 2/33 S.E.R. Ltd. **Gp. 9.**